MODERN PLASTICS

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NOVEMBER 1939

VOLUME 17 NUMBER 3

GENERAL INTEREST

TECHNICAL SECTION

NEWS AND FEATURES

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DECEMBER

Many may have wondered—or still are wondering what would happen to our plastics industry if war comes to this country, or if this country is unwise enough to go to war. Well, as soon as England entered the upheaval on the other side of the Atlantic, we took steps to find out what happened there. Now comes a story by John S. Trevor, titled: *The British Plastics Industry in War Time* which will appear in our December issue. Mr. Trevor reflects the optimistic attitude of the industry under pressure of war and indicates some of the new opportunities open to plastics in service to the country in protecting its citizens. He also points out the important demands on certain materials and states their availability.

Another friend of ours in England, who, because of his prominent associations wishes to remain anonymous, presents a brief summary of investigations regarding *Synthetic Resins as Water Softeners.* Here in this country, a combination of *Vulcanized Fiber and Laminated Phenolic* has come into recent use for protective devices in high voltage applications. Gerard A. Albert, National Vulcanized Fibre Co., discusses the principle of operation of these tubes, their general construction and applications. Also, the main features of newly improved *Injection Cylinder Units* are described in an article by W. H. Schwartz, Chief Engineer, Lester Engineering Co. All of these articles will appear in the December Technical Section.

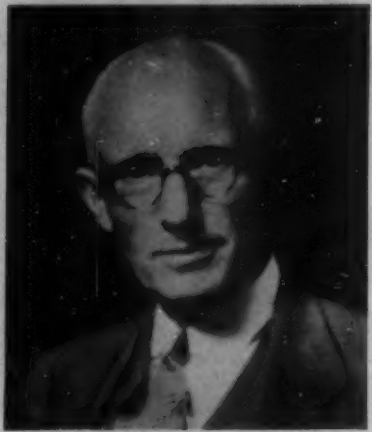
MODERN PLASTICS

NOVEMBER 1939 VOLUME 17 NUMBER 3

Awards in the 4th Annual Modern Plastics Competition

Grace A. Young

Harvey Wiley Corbett



Albert E. Marshall

Morris B. Sanders

Walter Dorwin Teague

JUDGES

Judging Modern Plastics Annual Competition is much more of a task than it appears to be at the first quick glance as each of the judges will testify. There are so many kinds of plastics, so many new applications, so many utilitarian and processing angles, to consider in the twelve groups of the competition that the responsibility of choice is magnified by each competing entry.

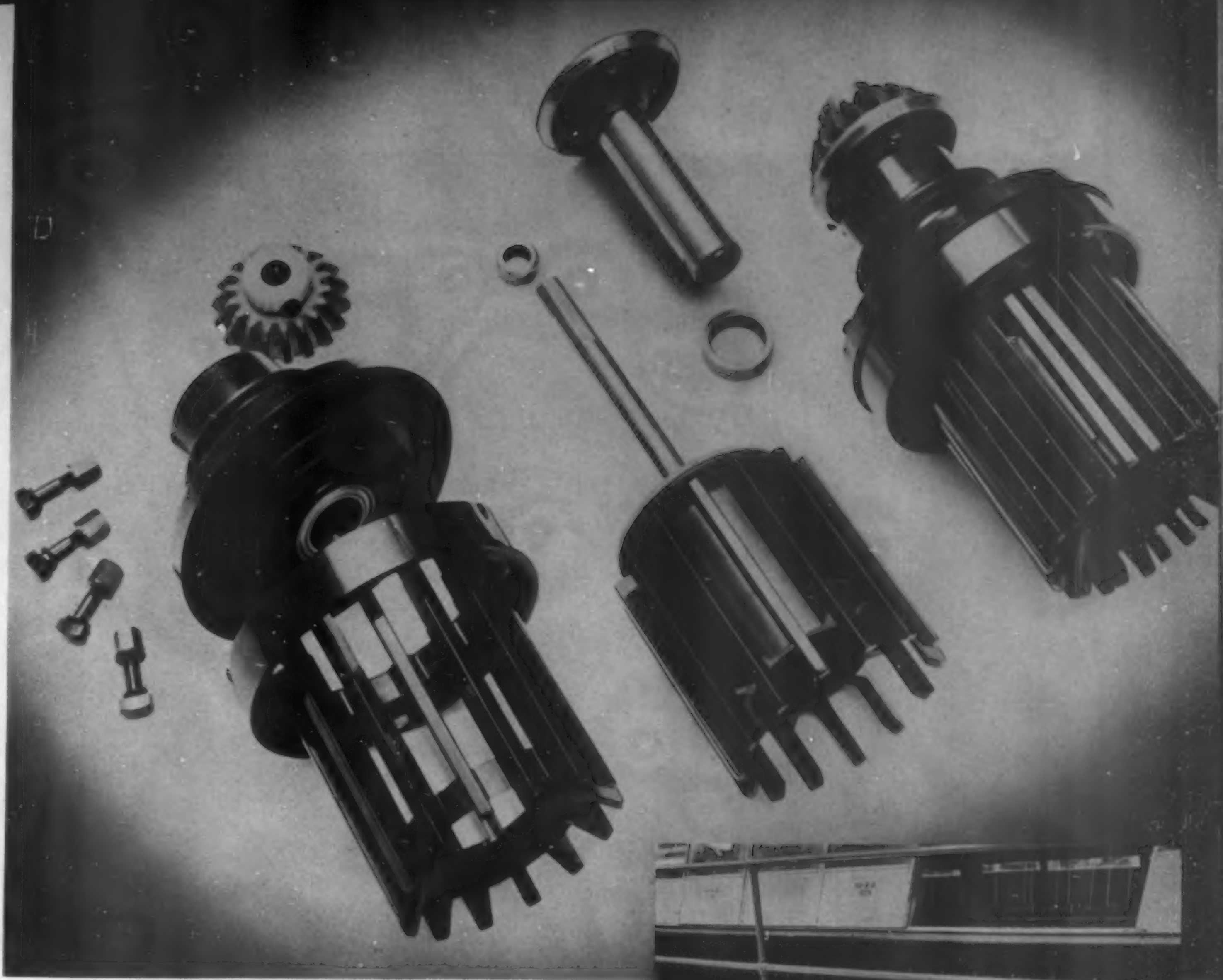
No better expression of the wisdom and experience of the judges is needed than the following illustrations which, within the limits of human facilities to judge and select, represent the outstanding progress in plastics production and plastics design during 1939.

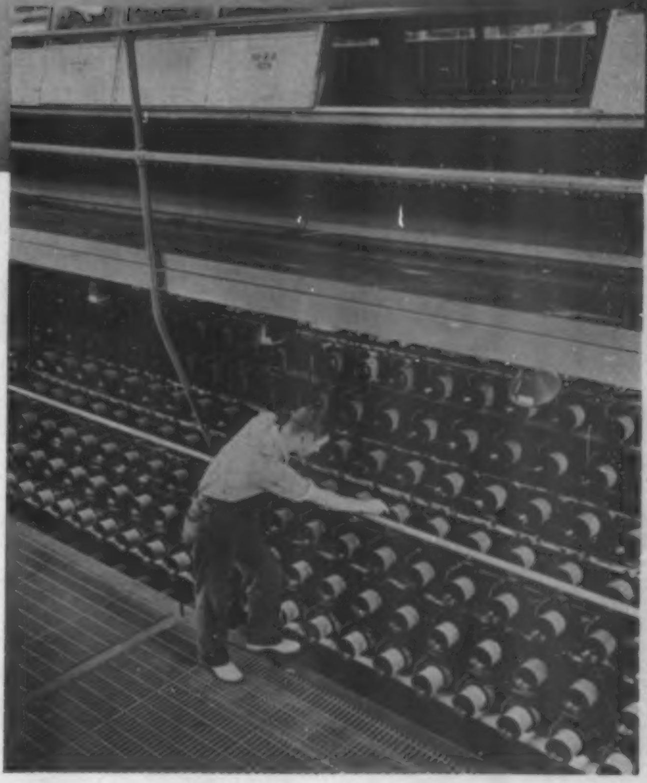
PRESENTATION DINNER

Modern Plastics' annual dinner, honoring those companies entering and participating in the Winning Entries, will be given at the Starlight Roof of the Waldorf-Astoria Hotel, New York, on Tuesday evening, November Fourteen.

Presentation of Awards will feature the program that evening and James Shelby Thomas, President of Clarkson College of Technology and also President of Chrysler Institute of Engineering, will be the speaker.

Detailed descriptions of Award winning entries with listings of designers and suppliers will be found on pages 68–74. Pho[illegible]y Joyce-Dravneek

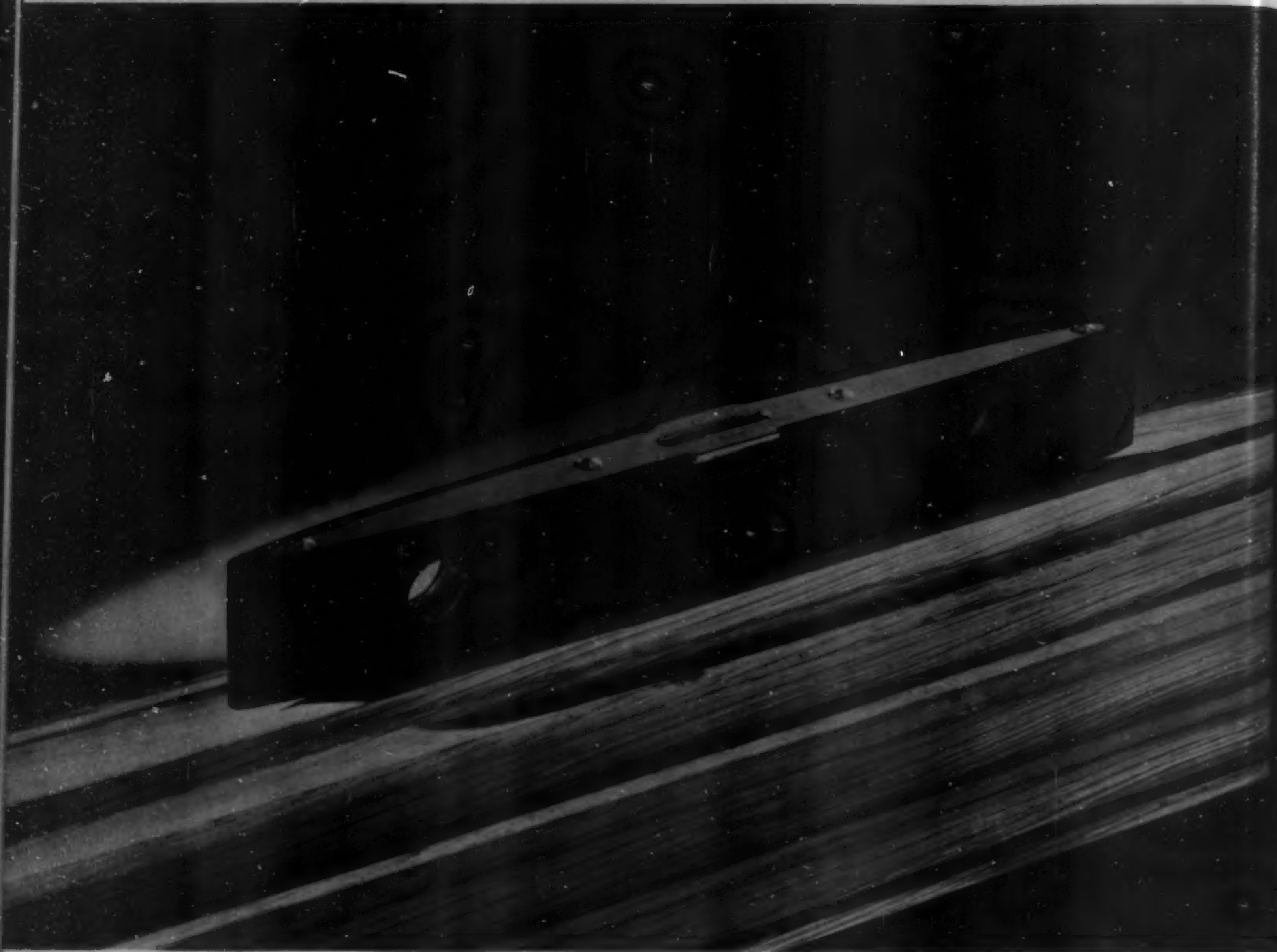




INDUSTRIAL PARTS, MOLDED

Award to RAYON MACHINERY CORPORATION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION



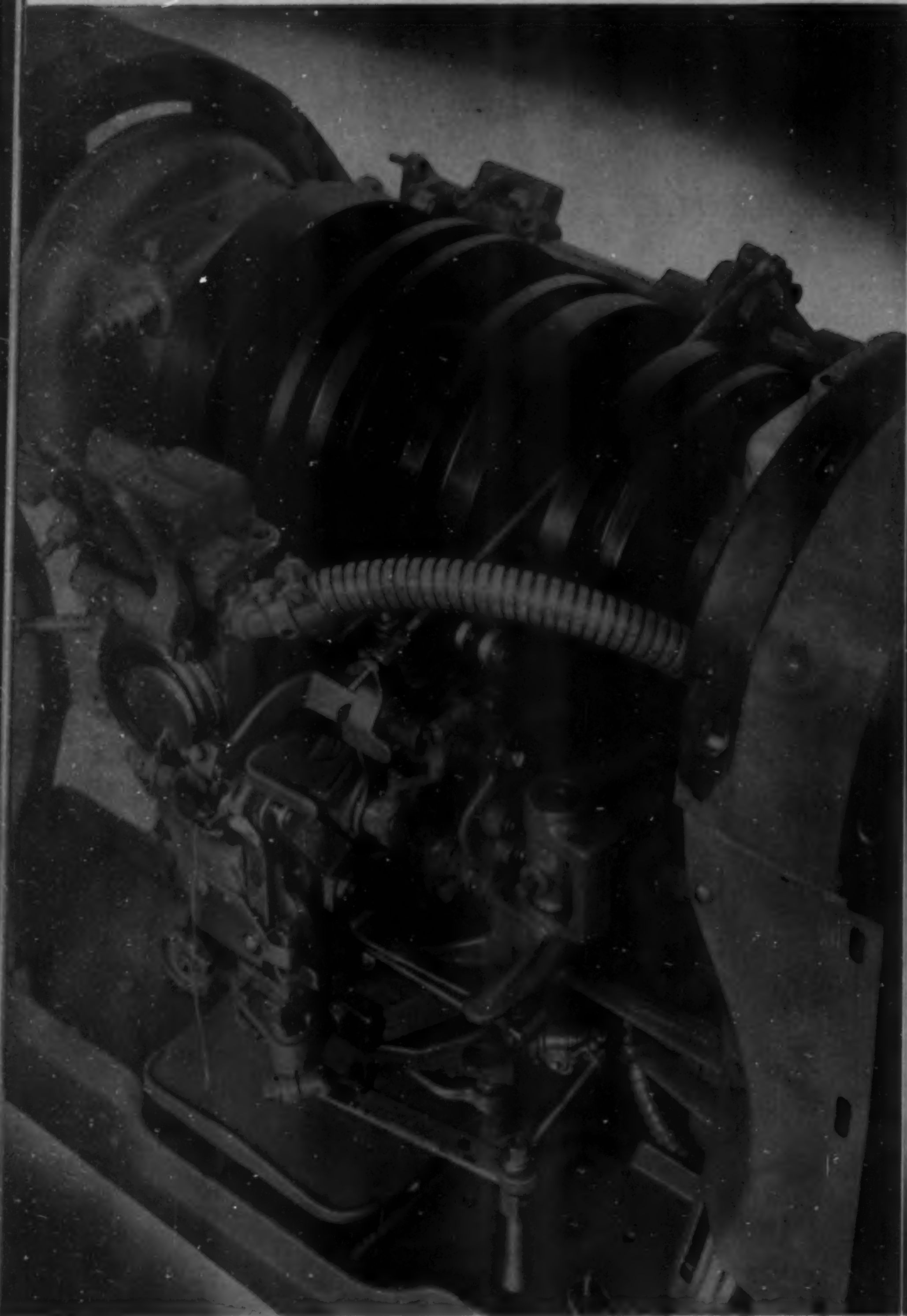
INDUSTRIAL PARTS, MOLDED

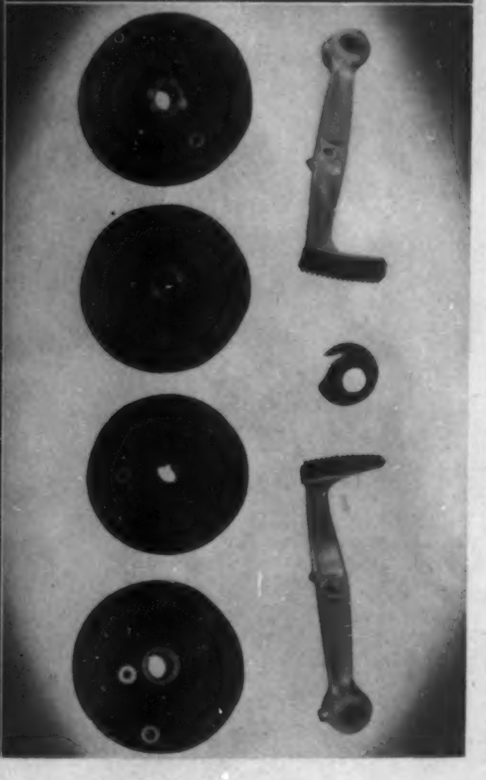
Award to MILLERS FALLS COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

INDUSTRIAL PARTS, MOLDED

Award to THE STENOTYPE COMPANY





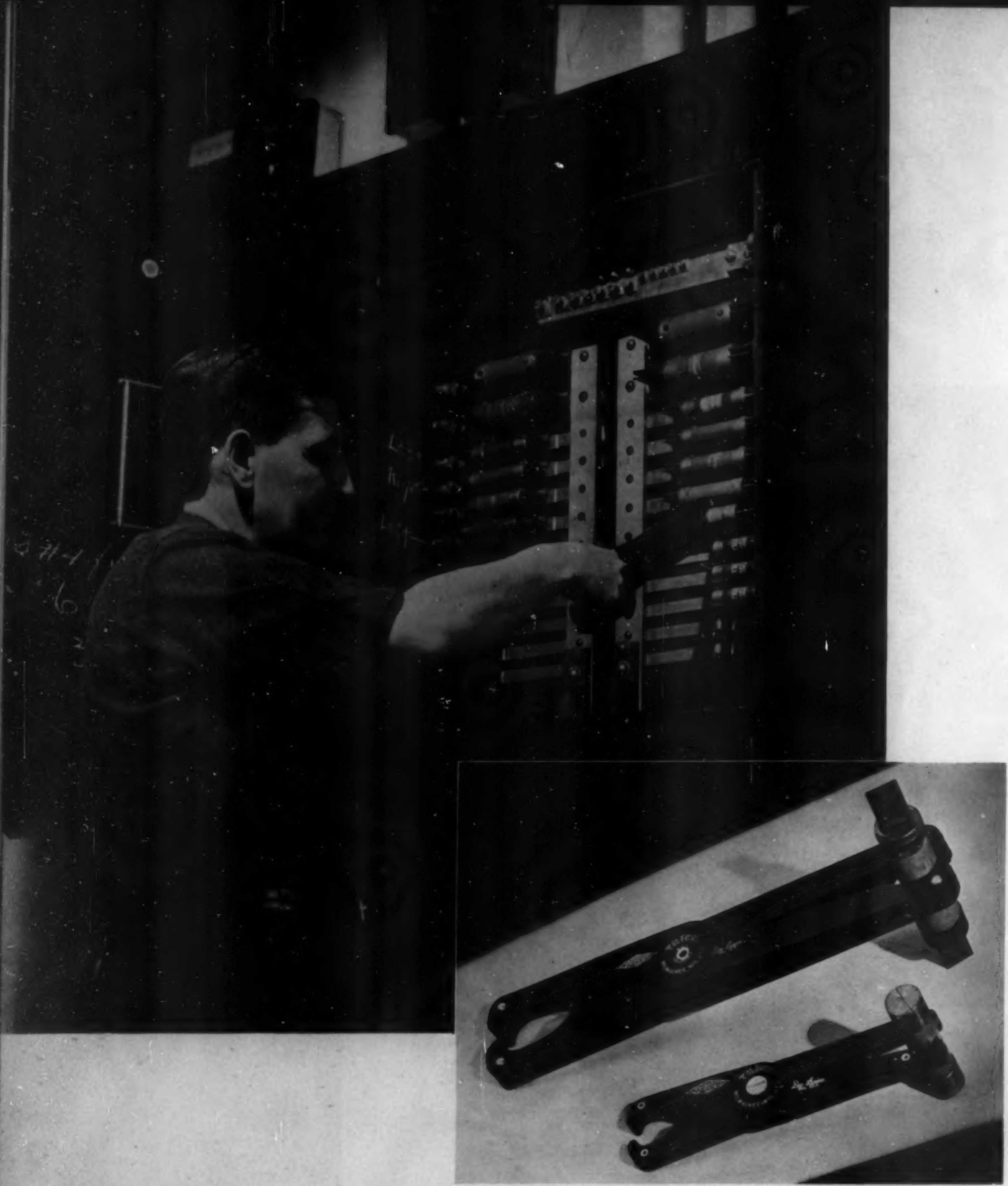
INDUSTRIAL PARTS, LAMINATED

Award to UNITED SHOE MACHINERY CORPORATION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

INDUSTRIAL PARTS, LAMINATED

Award to WESTINGHOUSE ELECTRIC & MFG. CO.



INDUSTRIAL PARTS, LAMINATED

Award to TRICO FUSE MFG. COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

INDUSTRIAL PARTS, CAST

Award to A. W. CASH COMPANY

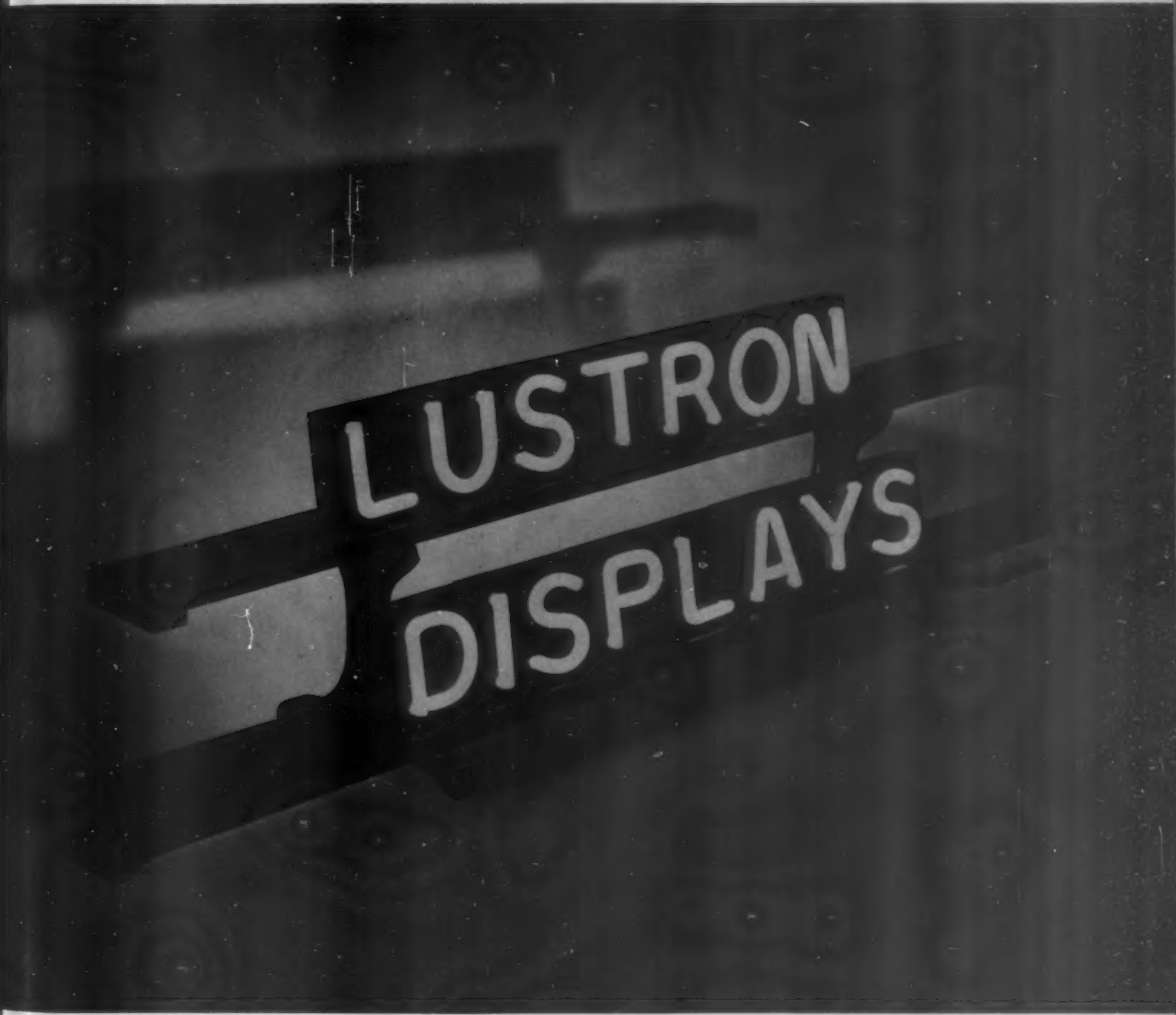
INDUSTRIAL PARTS, CAST

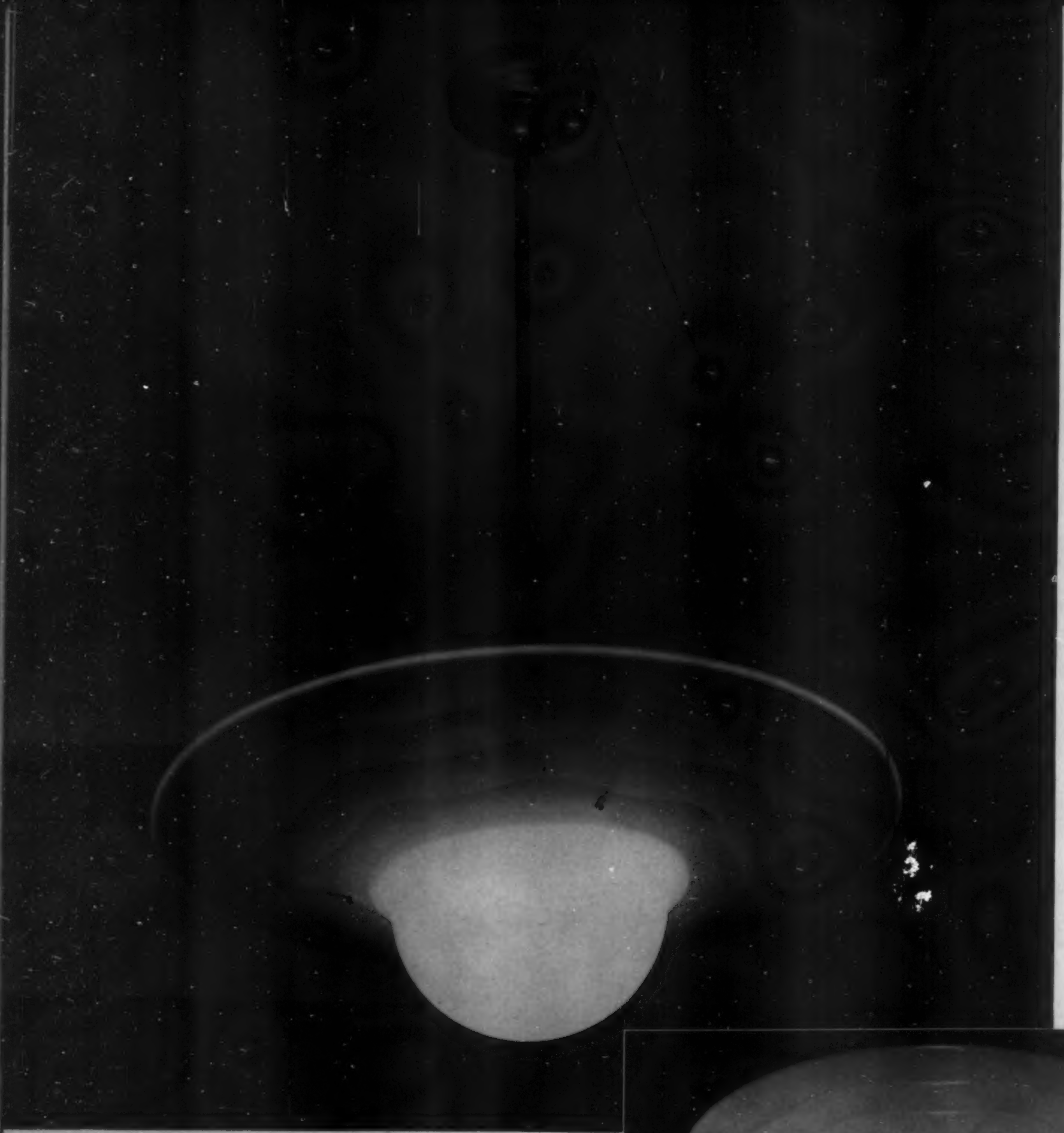
Award to **FREDERIC WEINBERG**

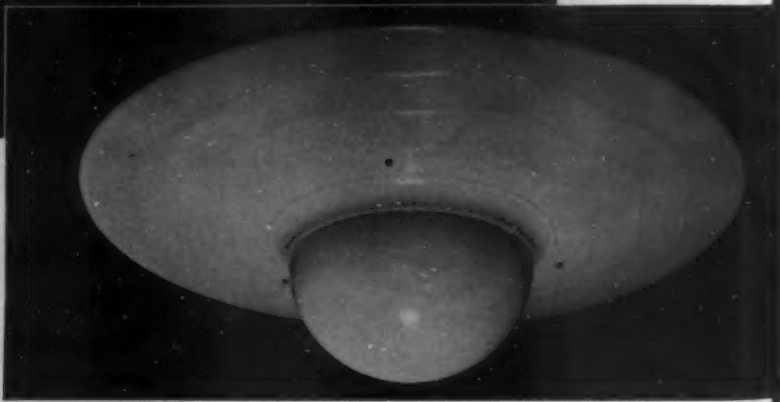
THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

INDUSTRIAL PARTS, CAST

Award to LUSTRON LIGHTS, INCORPORATED







DECORATIVE PRODUCTS, MOLDED

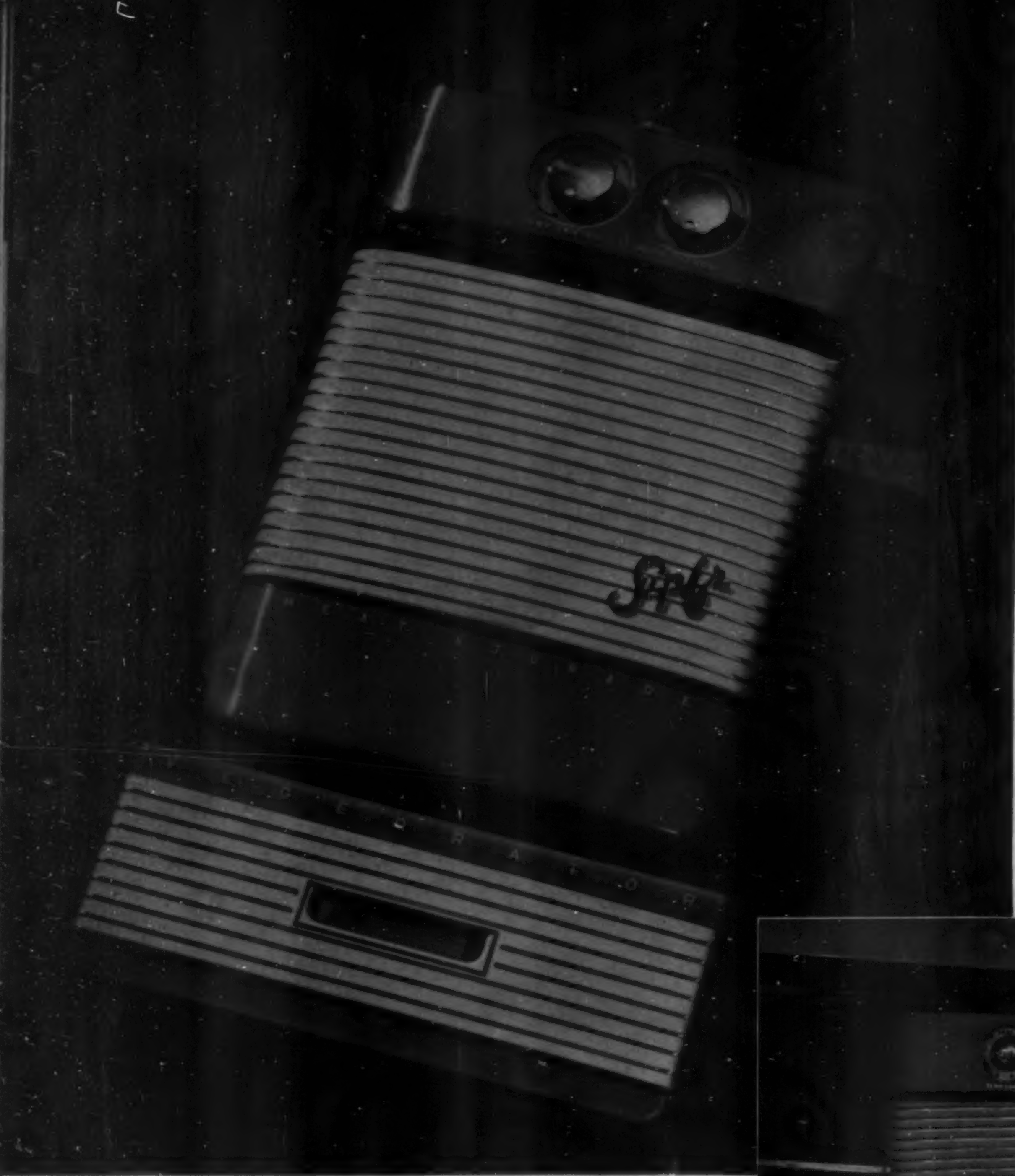
Award to MITCHELL-VANCE COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

DECORATIVE PRODUCTS, MOLDED

Award to RCA MANUFACTURING COMPANY



DECORATIVE PRODUCTS, MOLDED

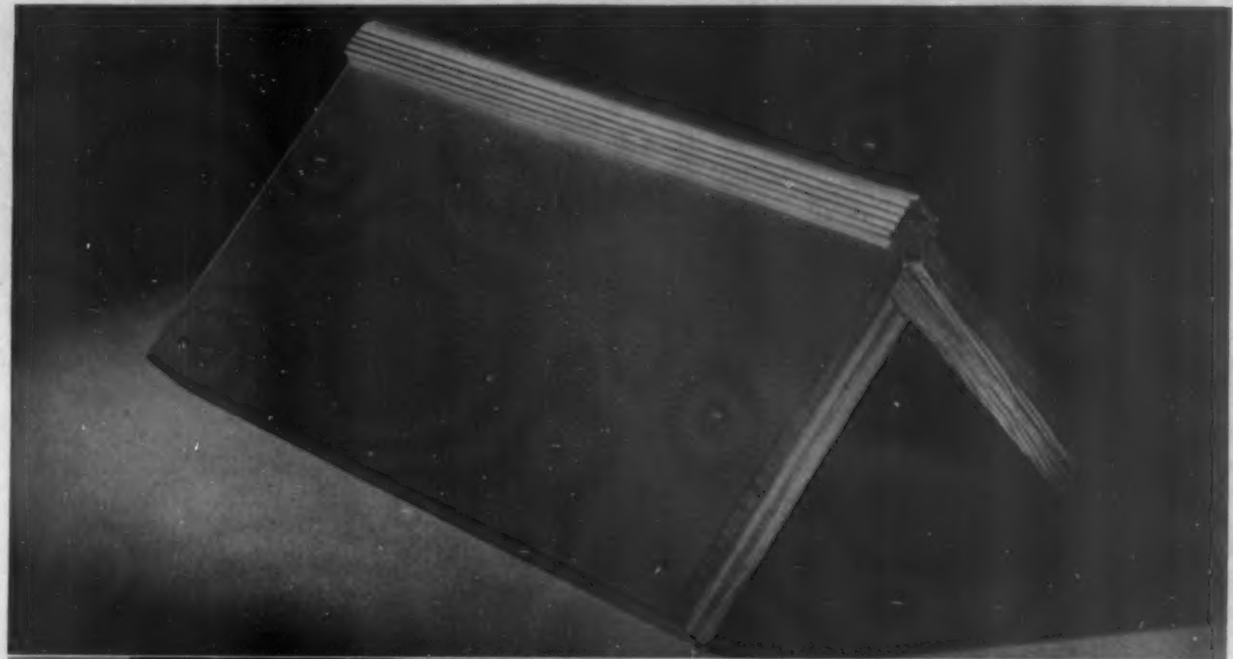
Award to SEARS, ROEBUCK AND COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

DECORATIVE PRODUCTS, LAMINATED

Award to LIBRARY OF CONGRESS



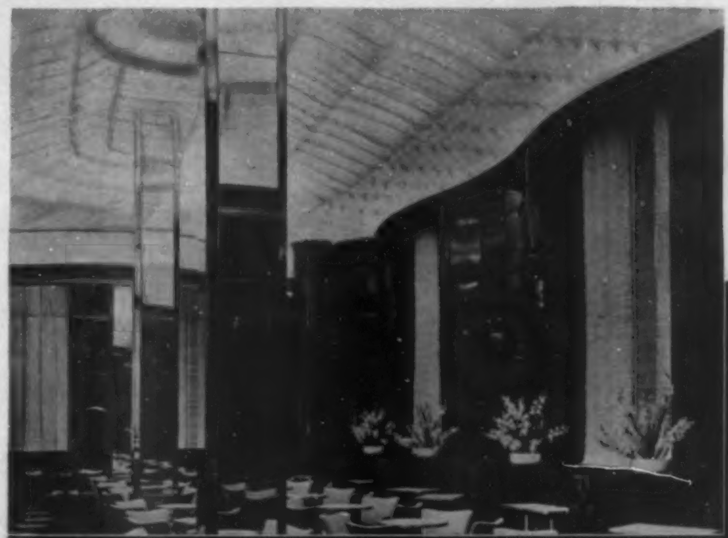
DECORATIVE PRODUCTS, LAMINATED

Award to **AMELIA EARHART LUGGAGE DIV.,**
ORENSTEIN TRUNK CORPORATION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

DECORATIVE PRODUCTS, CAST

Award to ST. FRANCIS HOTEL

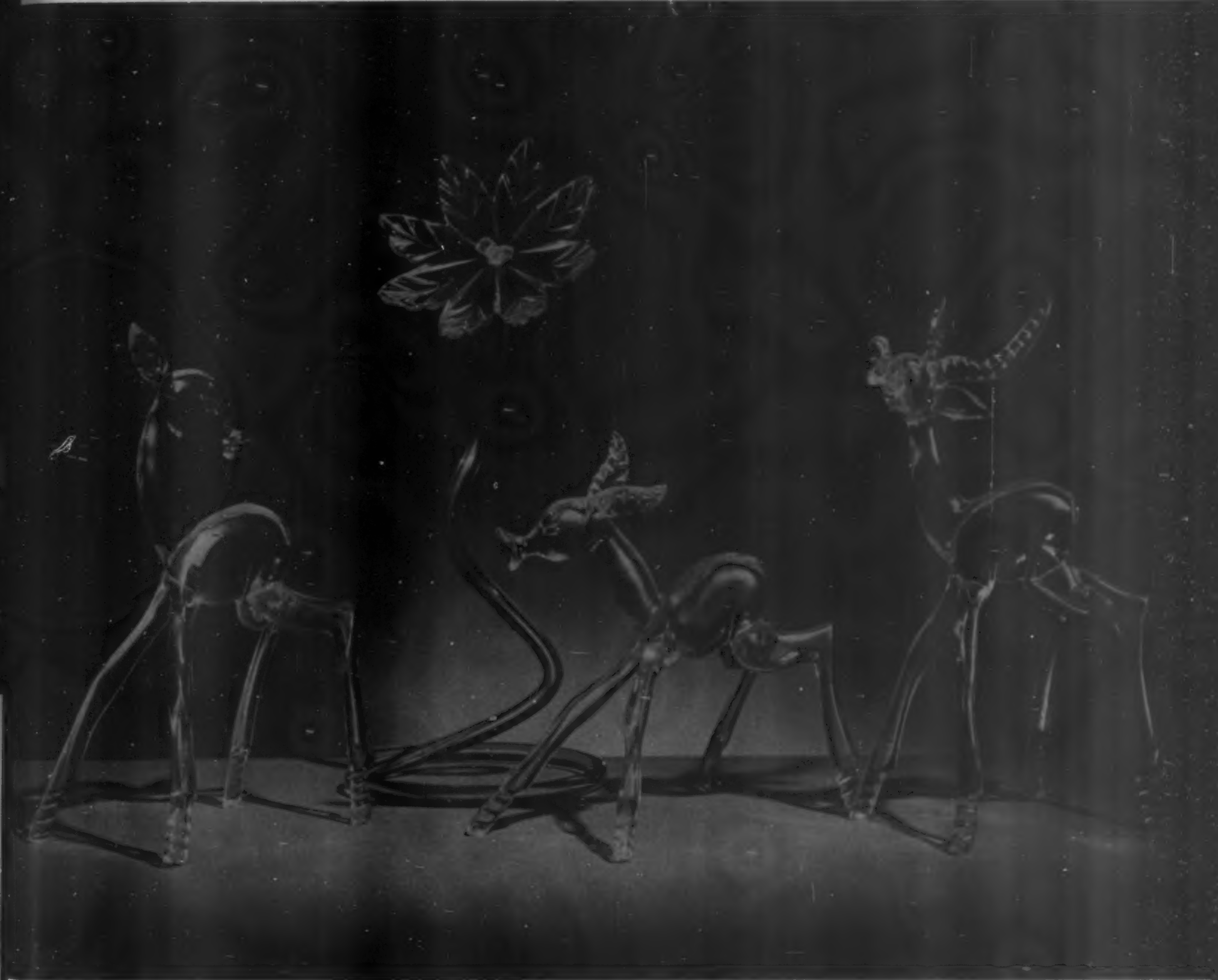


DECORATIVE PRODUCTS, CAST

Award to **CRYSTAL FIXTURE COMPANY**

DECORATIVE PRODUCTS, CAST

Award to DON MANNING AND COMPANY



HOUSEHOLD

Award to MAGIC-HANGER COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

HOUSEHOLD

Award to MASTER PLASTIC CORPORATION

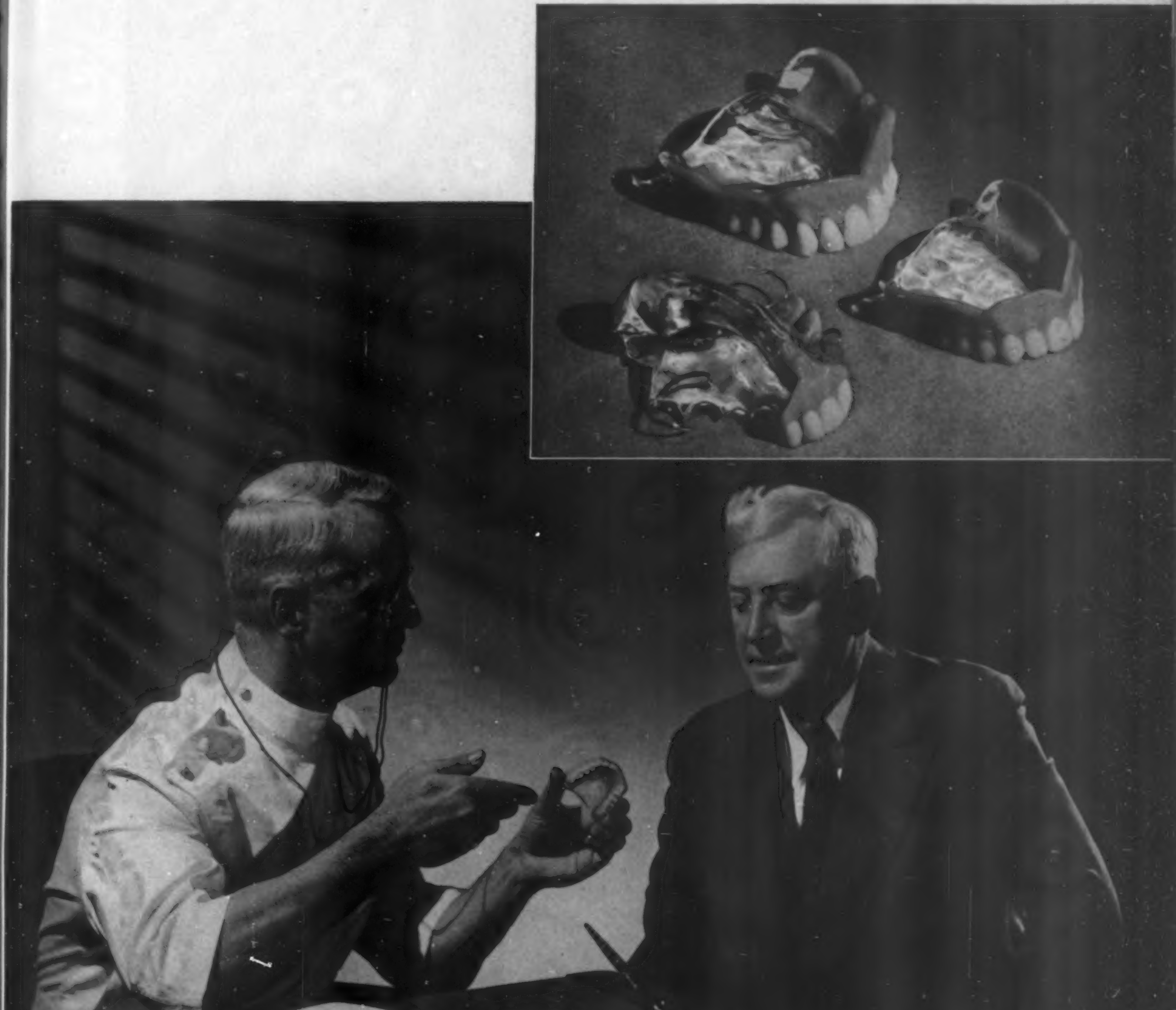
HOUSEHOLD

Award to LOCKWOOD PRODUCTS

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

SCIENTIFIC

Award to L. D. CAULK CO. AND VERNON-BENSHOFF CO.



SCIENTIFIC

Award to BAUSCH & LOMB OPTICAL COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

SCIENTIFIC

Award to OPTICAL RESEARCH, INCORPORATED

TRANSPORT

Award to DELTA ELECTRIC COMPANY

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

TRANSPORT

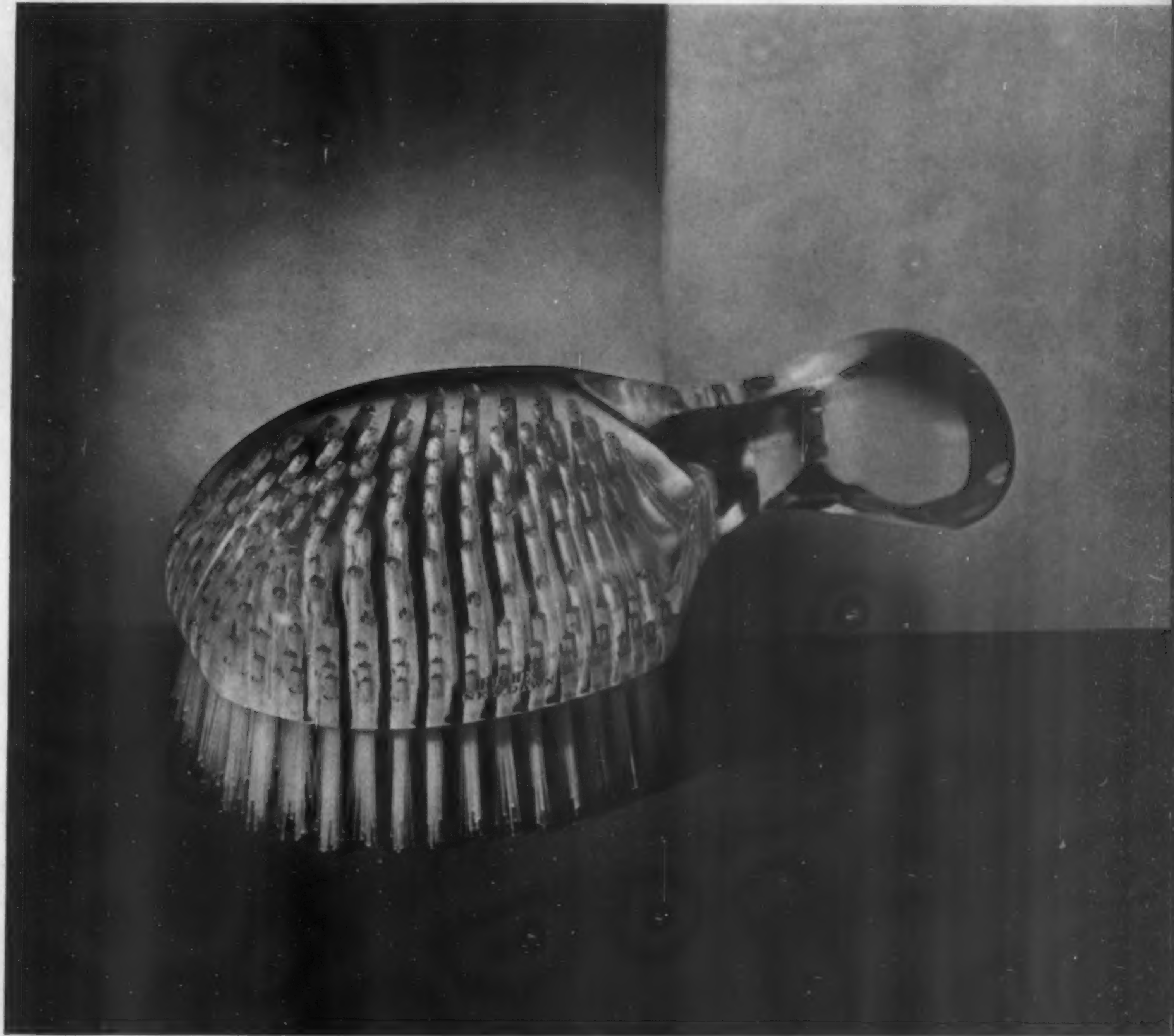
Award to NASH-KELVINATOR CORPORATION

TRANSPORT

Award to **CLIF H. MURFIN COMPANY**

STYLE

Award to HUGHES-AUTOGRAF BRUSH COMPANY, INC.



STYLE

Award to PEARSON HEEL MANUFACTURING COMPANY

STYLE

Award to FOLLMER, CLOGG & COMPANY

MISCELLANEOUS

Award to **KEN-WEL SPORTING GOODS COMPANY**

THE FOURTH ANNUAL MODERN PLASTICS COMPETITION

MISCELLANEOUS

Award to BERGEN TOY & NOVELTY COMPANY

MISCELLANEOUS

Award to E. M. O'NEIL & COMPANY

NOVELTY

Award to VIOLETTE, INCORPORATED

NOVELTY

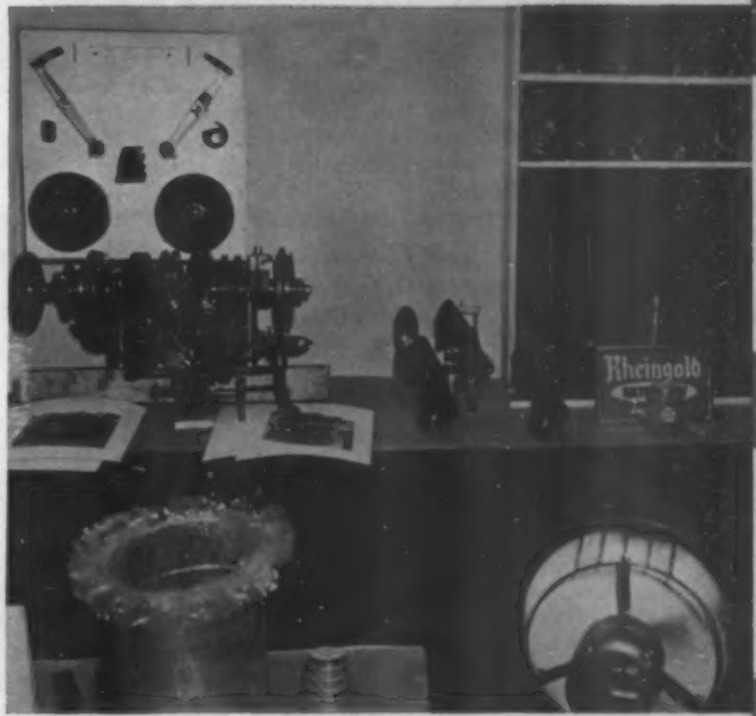
Award to AMERICAN STRAP COMPANY, INC.

NOVELTY

Award to VALDOR, INCORPORATED


LAUV-LITE
SIGNS
LUSTRON
DISPLAYS
ERRY MAS

MODERN PLASTICS FOURTH ANNUAL Competition is responsible for gathering together perhaps the most complete and representative assemblage of plastics ever displayed in one place. Outstanding examples of casting, fabricating, laminating and molding which embrace twelve major classifications, are grouped for easy comparison and review. Whatever your interest in plastics, you will not want to miss this important exhibit which is open daily from 10 A.M. to 4 P.M. (Saturdays until 12 noon) until December 15



RECORD OF PROGRESS

Plastics do not always replace other materials. Sometimes, through their own individual and characteristic properties, they progress by making it possible to do things which have never been done before. When they do replace other materials, the substitution is usually made because plastics exhibit some property or economy not present in the material displaced. Such progress is evident in these detailed descriptions of the award winning entries pictured on the preceding pages. Since progress is as much a matter of men as it is materials and machines, appropriate credit is given to those who contributed toward their design and manufacture

INDUSTRIAL PARTS, MOLDED

RAYON MACHINERY CORPORATION

Page 31

More than 86,000 plastic thread-advancing reels are in service on continuous spinning machines installed by Rayon Machinery Corp. at the Industrial Rayon Corp. plant in Painesville, Ohio. The yarn is spun on plastic reels inside the aluminum and glass spin bath on the upper level, and dropped to the processing section where it moves down from tier to tier on reels of the same chemically resistant plastic material, over which warm corrosive liquids and washes flow constantly.

The plastic thread-advancing reel is an ingenious mechanical handling device which has made possible for the first time the continuous spinning and processing of viscose rayon yarn. New, higher standards of yarn quality and uniformity, lowered processing time have been attained by the individual thread treatment provided by these reels.

Six years of research led to the adoption of a plastic chemically resistant to the processing liquors and which is commercially molded to the diameter and run-out tolerances of the bar members, and machined for proper assembly and accurate bearing fits.

Designer: Walter Knebusch and Richard F. Bergmann; Molding Compound: Durez, by Durez Plastics & Chemicals, Inc. Laminated seal clamp washers and macerated gears: Synthane, by Synthane Corp.; Flanged hubs: Partially Insurok, by Richardson Co.; balance Durez. Molders: Reel members by Richardson Co., General Industries, Inc., Northern Industrial Chemical Co.; Laminated seal clamp washers and bevel gears, Synthane Corp.; Equipment used includes presses by: Baldwin-Southwark Corp., Birdsboro Steel Foundry & Machine Co., Dunning & Boschert Press Co., French Oil Mill Machinery Corporation

MILLERS FALLS COMPANY

Page 32

This Torpedo Level goes to show that even commonplace mechanical equipment and tools can benefit by thoughtful, intelligent redesign and become more useful and better looking as a result. Molded of phenolic resin, the level is light in weight, practically impervious to oil, grease and water, and consequently less likely to warp than wood with any sort of a finish that would be commercially practical. The fine glossy black of the molded portion is enhanced by the use of a polished nickeloid top. Combined, they give a pleasing appearance to a useful household tool and provide a surface which will still look well after years of service. Torpedo shaped, the tool slips easily into the pocket.

Designer: Millers Falls Co.; Material: Bakelite, by Bakelite Corp.; Molds and Molding by Watertown Mfg. Company

THE STENOTYPE COMPANY

Page 33

Mechanical shorthand, made possible through this Stenotype machine, is increasing in popular use because of the possible speed by experienced operators. Recording lectures, board meetings, court testimony, etc., requires a portable device, light in weight and silent in operation. When the Stenotype Co. decided to redesign its former model, plastics were chosen because of their contribution to these factors.

The cost of the housing in plastics is only a fraction of the cost of the metal housing it replaced because it requires no applied finishing operations. Plastics also contribute to the shapely appearance since sheet metals are limited in flow and cast metals are expensive to finish.

Designers: W. B. Petzold collaborating with M. L. Larsonneur; Material: Textolite, by General Electric Co.; Molds and Molding: Plastics Dept., General Electric Company

INDUSTRIAL PARTS, LAMINATED

UNITED SHOE MACHINERY CORPORATION

Page 34

A combination of laminating and molding (graphite impregnated) has replaced case hardened steel for cams on new United Shoe Machinery Corp. shoe stitching machine. Result—total cam weight reduced 80 percent; low inertia for fast (stop and start) action; reduced horsepower required 50 percent; reduced cam installation cost 30 percent; reduced noise and vibration to almost none; reduced necessity of con-

stant lubrication; eliminated metal to metal contact and resulting wear; permitted 200 percent increase in machine speed with greater efficiency and durability; provided perfect balance by molding tracks and core; relieved shocks and strains on cam roll arms; and the slight resiliency due to the plastic, permitted 50 percent overload without distress.

Additional improvements were brought about by molding a gear segment on lever arms to eliminate noise and vibration—replacing steel. The former steel shuttle was also replaced by a molded plastic.

Designer: Research Div., United Shoe Machinery Corp.; Material: Textolite Laminated-Molded, by General Electric Co.; Molds United Shoe Machinery Corp.; Laminator-Molder: Plastics Dept., General Electric Company

WESTINGHOUSE ELECTRIC & MFG. CO.

Page 35

Enameled steel gives way to laminated plastics as door liner in this new Westinghouse household refrigerator. Low thermal conductivity of the materials means less heat leakage and lower electric bills. Decreased door thickness permits greater food storage space and the lighter weight of the laminated liner makes the door easier to open and close. Besides these advantages to the housewife, the new plastic door liner has simplified door construction, eliminating potential sources of service trouble and speeding up assembly in the manufacturing plant.

The integral urea laminated surface, easy to clean, is impervious to weak acids and alkalies, will not chip, crack or discolor.

Material: Micarta, laminated by Westinghouse Electric & Mfg. Co., using Beetle impregnating resin made by American Cyanamid Co.; Equipment: Watson-Stillman Co. press

TRICO FUSE MFG. COMPANY

Page 36

Safety is paramount in modern industrial plants. Every precaution is being taken to protect workers from industrial accidents with resulting loss of income and time. Great danger often exists in electrical and power plants where a slight miscalculation may mean electrocution.

These fuse pullers were created by Trico Fuse Mfg. Co. to prevent such disaster and laminated phenolic plastics are used in their manufacture because they provide perfect insulation for the worker on a dangerous job. The fuse pullers are built up of laminations which are punched from sheet stock and riveted together. They are rugged and sturdy but lightweight, convenient and safe under all atmospheric conditions.

Designer: Oscar H. Jung; Material, Laminator: Laminated Bakelite, by National Vulcanized Fibre Company

INDUSTRIAL PARTS, CAST

A. W. CASH COMPANY

Page 37

Vivid and dramatic, this transparent plastic model of a new Pressure Reducing and Regulator Valve makes use of clear cast acrylic for a striking visual presentation of the working mechanism. Each working part in operating position, design and structural detail are demonstrated without disassembling or using the cut-away type of presentation.

Hand-fabricated, the raw material was bent to rough casting form. Then, the rough acrylic blocks were machined and finished to shape the complete model. The versatility of acrylic resins, its clear transparency, rigidity, and ease of fabrication, are in no small way responsible for the emphatic effect of this visual display.

Design: A. W. Cash Co.; Material: Plexiglas, by Röhm and Haas Co.; Molds, Fabricator: Dave Swedlow Company

FREDERIC WEINBERG

Page 38

The dainty and fragile appearance of this transparent acrylic display hand belies its practical utility. Prepared for window or store display of jewelry, gloves, hose, etc., this almost invisible support is resilient, featherweight and relatively simple to fabricate. Design is functional, adaptable for many purposes. A minimum of material was used to keep cost as low as possible and strength was built in by careful forming of the material. Twisted to form the vertical stem, cast acrylic sheet was bent, under heat, and carved by hand, to define the graceful fingers. Clarity and edge-lighting properties of the plastic further enhance the dramatic beauty of the design.

Designer: Frederick Weinberg; Material: Plexiglas, by Röhm and Haas Co.; Molds, Molder: Croasdale and de Angelis

LUSTRON LIGHTS, INCORPORATED

Page 39

All the advantages of Neon, plus the advantage of movable letters, make this system of wireless tube lighting unusually practical and versatile for the display field. Called Lustron Lights, this illuminated advertising sign takes full advantage of the beauty, insulation value and lasting color and finish of cast phenolic resin.

Each letter, a complete self-enclosed unit, is mounted on a cast resin background. Letters can be arranged and lighted individually and are interchangeable. The source of power is a radio frequency oscillator, built in a compact container unit operating on low voltage, which may be plugged into an outlet. Signs are built for either AC or DC current, though Neon operates only on DC. Double backs, unsightly cross covers, and tube electrodes are eliminated.

Designer: Lustron Lights, Inc.; Material and Molds: Catalin, by Catalin Corp.; Fabricator: Plastic Turning Company

DECORATIVE PRODUCTS, MOLDED

MITCHELL-VANCE COMPANY
Page 40

Maximum light output with no sacrifice of eye comfort and appearance were achieved in the Plastolux Reflector by planning for design and construction that would take fullest advantage of the plastic used. Molded urea resins produced form and colors that could be accurately controlled, assuring an exact reproduction of the original in the desired tint, throughout production. Flexibility of design placed no limits on intricate parts. Light output of each segment was gaged before constructing the die. Even reflection and transmission of light were secured by careful determination of thickness, shape and color of the plastic unit.

The central portion of the luminaire, 9 in. deep and 9 in. in diameter, is the thickest, and nearest the lamp. A series of concentric wavy rings flare away from this bowl at an angle, decreasing in thickness. Decorative, they give an excellent light spread. Although 24 in. in diameter, the reflector appears much smaller. Attractive in color, urea plastics supply light weight, sturdy durability, as well as efficient pleasant lighting.

Designer: E. B. Kirk; Material: Beetle, by Beetle Prod. Div., American Cyanamid Co.; Molder: Mack Molding Company

RCA MANUFACTURING COMPANY
Page 41

Lined up with military precision, 40 records fit in individual compartments of the RCA molded record rack. Smooth, non-scratching surfaces, handsome appearance, light weight and strength were primary demands. Special phenolic molding compound was developed for this large piece which would permit economical construction. The intricate design of 39 curved record spacers placed every $^{7}/_{16}$ in. apart, complicated the mold construction. Grooves between the spacers had to be machined out of a solid steel block to eliminate parting lines and insure smooth surfaces. Warpage due to the narrow curved spacers was effectively controlled. Trademark and numbers identifying each separation were printed by a machine using inexpensive quick-drying inks. Assembly cost was reduced by fastening bumper plates with speed nuts, without removing the holder from its shipping container. Dimensional stability and accurate molding qualities of the material, advanced molding technique, unique assembly and decorative methods, combined to produce a practical attractive rack.

Designer: J. Vassos; Material: Textolite, by General Electric Co.; Molds, Molder: Plastics Dept., General Electric Co. Special fastening: Speed nuts by Tinnerman Stove & Range Co., Speed Nut Div.; Printing: Markem Machine Company

SEARS, ROEBUCK AND COMPANY
Page 42

An entirely new color effect for the interior of Sears Roebuck's de luxe Coldspot refrigerator is produced by molded polystyrene control panel, compartment door front, and decorative name strips. Easy to read, letters and numerals are molded into a crystal-clear piece, then filled in with white paint. The back is painted a delicate blue. Polystyrene is employed for both decorative and utilitarian purposes in refrigeration since it does not become brittle or lose strength at temperatures as low as —30 deg. C., remains unaffected by moisture, does not give off or absorb odors and tastes. The transparent plastic front and trim, used in combination with the anodized aluminum evaporator door, definitely add subtle richness and quality to the usual food storage compartment, and decrease food spoilage due to heat loss and moisture.

Designer: John R. Morgan; Material: Bakelite polystyrene, by Bakelite Corp.; Molds and Molder: Cardinal Corp.; Equipment: Lester molding machine, by Phoenix Ice Machine Corporation

DECORATIVE PRODUCTS, LAMINATED

LIBRARY OF CONGRESS
Page 42

Building for permanence as well as for economy and efficient operation, the architects for the Congressional Library Annex, in Washington, D. C., specified laminated plastics for many surfaces where constant use and cleaning brings abrasive action and wear. Wall panels, book shelves, base board, chair rails, door trim, table tops, tops and parts of delivery desks, even corridors and telephone booths were surfaced with this long-life material. Most interesting use, perhaps, is for 15,000 card file drawer fronts for which a special urea laminate nearly $^{1}/_{2}$ in. thick was machined to shape.

The Morroco finish and soft cool shade of green, especially created, distinguished the laminated material and adds richness. The top photo illustrates the method of installing the permanent laminated surface.

Architects: Pierson & Wilson, Collaborating with David Lynn, Architect of the Capitol; Material, Fabricator: Formica, by Formica Insulation Company

AMELIA EARHART LUGGAGE DIV., ORENSTEIN TRUNK CORPORATION
Page 44

Distinctly novel, smartly styled Amelia Earhart suitcases lighten the traveling burden by their woven laminated plastic coverings. An entirely new medium for luggage cases, the plastic material provides that spruce trim look that modern globe trotters demand, and has excellent wearing qualities. Its rich smooth finish is inherent in the lamination. The underlying foundation of bent plywood, eliminating glued joints and the use of special reinforcing methods, make these cases lighter and stronger. Aeronautic technique and methods of

manufacture were applied to achieve this result. The covering material on these cases is made by weaving thin strips of fine wood veneers into delightful patterns, protected and given unusual toughness by laminating with plastic resin. Remarkable resistance to rough handling, the covering will not scuff, discolor, tear nor deteriorate. Beautiful shades of mahogany are used on this luggage and it is made in a variety of shapes and sizes. Patented cushion edges, bound with leather, protect the edges, the most abused parts of any case. Well-chosen interior fittings complete the design. The unconventional methods used in fabricating a plastic covered suitcase, decrease the number of necessary parts and joints, improving strength without added weight. Leather and transparent plastic handles are available.

Designer: Samuel Orenstein; Material: Parkwood-Textolite, by Parkwood Corp. and General Electric Co.; Fabricator: Plastics Dept., General Electric Co.; Lucite for handles: by du Pont

DECORATIVE PRODUCTS, CAST

ST. FRANCIS HOTEL

Page 45

This leaf panel is one of six different types used in a plastic ceiling for the Cocktail Lounge of the St. Francis Hotel, San Francisco. Transparent material was chosen because of its ability to catch, bend and transmit light waves when edge-lighted. The material was chosen also because the lighting system of constantly changing, ebbing and flowing colors is particularly adaptable to this material which is easily formed and engraved. The object of the entry is to show one example of the unusual possibility of this material when molded into decorative shapes due to its natural sparkle and its ability to transmit and reflect light.

Designer: Timothy Pfleuger; Material: Lucite, by du Pont; Fabricator: Dave Swedlow Company

CRYSTAL FIXTURE COMPANY

Page 46

Purely decorative, this elongated pup clearly demonstrates what ingenuity and a few rods of clear transparent plastic will do. It was designed as an attention arrester for window display and illustrates the versatility of acrylic resin rods in the hands of a craftsman with an eye for form. Proportions were maintained by devising a mold of wood and metal over which the rods, heated in hot water until soft, were formed.

Designer: E. R. Wolf; Material: Lucite, by du Pont; Fabricator: Crystal Fixture Company

DON MANNING AND COMPANY

Page 47

This entry is representative of an extensive and growing use of clear transparent resin to fabricate glass-like non-fragile table decorations of intriguing design. The hand-sculptured pieces are an entirely new creation in materials and design and fill a definite demand in decoration.

The transparent material has the advantage of high light transmission qualities so that unusual and beautiful displays may be obtained by using lighting effects which cause the figures to catch and radiate the light at the points of sculptural detail.

Designer and Fabricator: Don Manning & Co.; Material: Lucite, by du Pont

HOUSEHOLD

MAGIC HANGER COMPANY

Page 48

The Magic Hanger is an excellent example of functional design. Recognizing that almost all women's garment hangers are improperly designed to fulfil their purpose, this designer started from scratch. Result—a hanger which is thin, lightweight and capable of satisfactorily hanging 99 percent of the garments in a modern woman's wardrobe.

There is not an ounce of waste material nor a particle of excess decoration or gadgetry, yet it will hang skirts, suits, slips, or gowns without danger of their slipping off. Loops are provided for skirts; spring clips for strap garments and ridged shoulder pieces for sleeved garments.

Light, colorful, strong and durable, Magic Hangers are injection molded (for economy) from cellulose acetate which is tough and durable and will not collect dust or dirt to soil garments.

Designer: James F. Fewster; Material: Monsanto cellulose acetate by Monsanto Chemical Co.; Molds: Guy P. Harvey & Sons; Injection press: Reed Prentice Corp.; Molder: Plastic Molded Arts, Incorporated

MASTER PLASTIC CORPORATION

Page 49

The important thing about the Master Humidor is its controlled humidifying unit which is constructed so that vapor escapes from the well and plug only when dry air and tobacco within the jar exert enough suction to draw it out.

Next in importance comes the choice of material, a cellulose acetate, which gives beauty and color coupled with light weight and makes the assembly both attractive and inexpensive as an advertising premium.

The jar is made from four separate injection moldings including the vapor plug. It is available in any color combinations of mottled or clear material. Less breakage and light weight lower shipping costs.

Designer: L. R. Klingler; Material: Lumarith by Celluloid Corp.; Mold: Master Tool & Machine Co.; Injection press: Reed-Prentice Corp.; Molder: Central Die Casting Company

LOCKWOOD PRODUCTS

Page 50

Baby Dyner is the name given to this ingenious device which keeps baby's food warm while he plays with his cup and spoon. The base, which holds warm water to supply heat, is molded of black phenolic material, while the cup and food tray are molded of colorful urea. They are not really unbreakable but will stand a lot more dropping and banging around than crockery, yet are cleaned with equal ease.

Designer: Alfred L. Mell; Materials: Bakelite (phenolic), by Bakelite Corp., Plaskon (urea), by Plaskon Co., Inc.; Molds and Molder: Auburn Button Works, Incorporated

SCIENTIFIC

L. D. CAULK CO. AND VERNON-BENSHOFF CO.

Page 51

Both the above companies share equally in this award because their entries were considered by the judges to be practically identical in originality and workmanship, although different but comparable materials were employed. L. D. Caulk Co. made the Lucitone denture while Vernon-Benshoff Co. made its of Vernonite. The superiority of clear transparent acrylate or methyl methacrylate, from which these dentures are made, comprises strength, stability, ease and economy in molding, compatibility with tissue, cleanliness and aesthetics.

The transparent plate enables the dentist to observe for the first time its adaptation to the tissues, and when in the mouth, renders the appliance practically invisible. The tinted material around the teeth is non-fading and embodies a slight mottle or veined structure more closely resembling natural tissue than does a solid color. The clear plastic produces the "feel" as well as the appearance of cleanliness.

Shown with the other plates is an Obturator (Vernonite) or artificial denture to make possible normal speech or swallowing for that occasional unfortunate known as a cleft palate patient. These methyl methacrylate dentures represent a notable advance in prosthetic dentistry.

Designer: (L. D. Caulk Co. entry) Chas. J. Tracy; Teeth by Denny Cornelius and Dentists' Supply Co.; Material: Lucitone, by du Pont; Processed by Chas. J. Tracy.

Designer: (Vernon-Benshoff Co. entry) Henry P. Boos Dental Laboratories; Material: Vernonite, by Röhm & Haas Co.; Processed by Henry P. Boos Dental Laboratories

BAUSCH & LOMB OPTICAL COMPANY

Page 52

The Balar Binocular Field Glass was designed to offer a small field glass of fine quality which could be slipped easily in the pocket or purse. Its rectangular shape provided a unique design for this purpose as well as lowering the manufacturing cost.

The shape also permits a wide field of view rather than a large circular field, an advantage for all of the field and sports purposes for which the glass was designed. The plastic case contributed to the light weight of the glass and to its smooth and attractive appearance.

Designer: Otto Trantman; Material: Bakelite, by Bakelite Corp.; Molds and Molder: Auburn Button Works, Incorporated

OPTICAL RESEARCH, INCORPORATED

Page 53

This glass and plastic contact lens was designed to overcome visual difficulties caused by kerotoconus and scarred corneas; and to replace ordinary spectacles when these proved undesirable. The glass lens is worn in intimate contact with the eyeball with only a layer of water between the lens and the cornea. Thus the lens in effect forms an artificial cornea and its optical power corrects the errors in vision. A molded plastic rim holds the glass lens in the proper position before the eye. This type of lens is meeting a growing demand to replace spectacles because in use it is practically invisible.

The use of a molded plastic for the rim makes it possible to economically manufacture the lenses with rims of sufficient variety of size to fit a larger percentage of eyes. The molded plastic also makes possible the economical duplication of the rims to close limits. The plastic used does not irritate the tissues in the eye.

Designer: Wm. Feinbloom; Plastic material: Crystalite, by Röhm & Haas Co., specially prepared and colored by Schwab & Frank; Molds: Precise Instrument Co.; Molder: Optical Research, Incorporated

TRANSPORT

DELTA ELECTRIC COMPANY

Page 54

The Delta Guardlite is reputed to be the first plastic shell bicycle light, and was introduced both as an advanced idea and to carry out beauty of design. The modern trend of the tail light following automotive ideas is readily apparent and the contrast of the lustrous black shell and brilliant red lens presents a pleasing appearance.

The cost is well within the purse of the average rider and the lens arrangement, extending around the sides, provides additional protection as it allows the light to shine on each side as well as to the rear. The shell is rust-proof and corrosion-proof, thus eliminating the two troubles most common on bicycle lights.

Designer: Barnes & Reinecke; Material: Tenite by Tennessee Eastman Corp.; Molded by Chicago Molded Products Corp. on Reed-Prentice plastic injection molding machine

NASH-KELVINATOR CORPORATION

Page 55

The instrument panel assembly, including the horn button and "weather eye" of the 1940 Nash car exhibit two definite improvements in automotive design. First: The choice of a dignified restful gray of unusual apparent depth; and an entirely new method of achieving the effect which is designated as "See-Deep."

The result is a remarkable depth and crystal effect brought about by spraying or flocking the reverse side of clear cellulose acetate butyrate parts without disturbing their smooth and clear exterior surfaces. Lettering and design are molded in the back of the crystal-like plastic, then filled with color (before flocking) which presents the appearance of hand-sculptured work. More and more the use of plastics is adding color and beauty to the modern automobile.

Designer: Nash-Kelvinator Corp.; Materials: Clock crystal is Lucite, by du Pont, molded by Boonton Molding Co.; all other plastic is Tenite II by Tennessee Eastman Corp.; Molds and Molding: The Cardinal Corp.; Equipment: Reed-Prentice Injection Molding Press

CLIF H. MURFIN COMPANY

Page 56

It looks as though the Clif H. Murfin Co. has something here. They have taken the familiar automobile emblem of the AAA and by molding it from cellulose acetate have created a durable insignia plaque that will neither tarnish nor corrode.

Furthermore, since the color is integral with the plaque and goes all the way through, it is possible to use a light color (ivory-white), with contrasting letters (wiped in), which is easy to read and easy to clean.

Although fragile in appearance, this material is really tough and resilient, with the result that it will provide a better-looking emblem at considerably less cost.

Designer: Clif H. Murfin Co.; Material: Lumarith, by Celluloid Corp.; Molds and Molding: Kilgore Mfg. Company

STYLE

HUGHES-AUTOGRAF BRUSH CO., INC.

Page 57

This brush represents a striking use of two new plastics for a man's hair brush. The smooth hand-fitting brush back and handle are molded from clear plastic while a new synthetic filament is used for the bristles.

The brush has been designed in streamlined fashion and presents an entirely new style and new materials not heretofore used for the purpose. The clear back and handle encourage cleanliness and sanitation because any dirt lodging at the base of the bristles may be quickly seen and easily removed.

Designer: Hughes-Autograf Brush Co., Inc.; Materials: Lucite for back and handle, Exton for bristles, both by du Pont; Molding and assembly: Hughes-Autograf Brush Co., Incorporated

PEARSON HEEL MFG. COMPANY

Page 58

For many years attempts have been made to find a material or method of construction that would eliminate the excessive breakage of wood heels on women's shoes. This breakage occurs both in forming the heels and after they have been attached to the shoe, due to irregularities in the wood grain and texture. Many attempts have failed because of the necessity of changing over all shoe machinery and equipment for affixing the heels to the shoes.

During the past year, the Pearson Heel Mfg. Co. designed a plastic heel with a honeycomb construction in the upper part which permits it to be nailed in the ordinary way with current shoe making equipment. These new heels are injection molded of cellulose acetate which is sufficiently tough and flexible to permit the nails to become imbedded for a permanent grip. Furthermore, these plastic heels will not scuff, split or chip. A patented clip holds the top lift in place, yet can be replaced as often as required as top lifts (which are of leather) wear down. A special top lift is easily snapped in, anchoring itself. Bright or conservative colors are available and rhinestones or other decorations can be imbedded or applied to evening slippers.

Designer: W. J. Walsh; Material: Textolite cellulose acetate, by General Electric Co.; Molds and Molding: Plastics Dept., General Electric Company

FOLLMER, CLOGG & COMPANY

Page 59

Cast resin for umbrella handles is not new. This material has been used successfully for many years. But the variation and departure from clear cast resins by introducing flakes and chips of color and metallics is distinctly new. In fact it is in direct contradiction to the usual procedure of striving to keep the resin clear.

These flakes or chips are of such nature that they float in the material but do not form cracks and do not precipitate in the resin. Therefore, practically any color variety can be effected by this method.

Metallic flakes are also used in practically all color shades, some resembling tiger-eye and goldstone.

Material: Gemstone, by A. Knoedler Co.; Fabricator: H. M. Musser & Company

MISCELLANEOUS

KEN-WEL SPORTING GOODS COMPANY

Page 60

Tennis and squash racquets of conventional manufacture permit the strings to cut into the wood, thus loosening in time and rendering the racquet useless. A racquet with loose strings cannot be used in play. Also, occasionally when stringing a racquet the frame, because of its grain, would split. The insertion of the laminated plastic strip within the grooved section around the outer periphery prevents the string from cutting the wood, and therefore, eliminates the danger of having the string loosen or of splitting the frame.

Designer: J. L. Kleinman; Material: Phenolic (Bakelite) impregnated laminate by Spaulding Fibre Company

BERGEN TOY & NOVELTY COMPANY

Page 61

Ideally suited to toy manufacture, cellulose acetate is non-hazardous in the presence of fire, non-toxic, virtually unbreakable and light in weight. Toys are consequently easy to handle and safer to play with than those which are manufactured of heavy metal.

The material comes in all colors, is capable of economical injection molding which is essential for mass-produced articles of this sort. When surface coloring is required it may be applied and subsequently lacquered to bring out contrasting colors and protect them from wear.

Design and Molds: Bergen Toy & Novelty Co.; Material: Tenite, by Tennessee Eastman Corp.; Molder: Columbia Protektosite Co., Incorporated

E. M. O'NEIL & COMPANY

Page 62

This Roulette wheel, excepting the bearings and head, is made entirely from transparent plastics, the various parts being shaped, formed and joined from flat molded acrylic sheets.

The idea behind this production is to offer players a visibly honest professional game and to attract players through the use of a colorful and distinctly novel and exciting-looking device.

It is truly an outstanding example of the plastic fabricating arts in the opinion of the judges.

Designers: P. F. Brueckner and E. M. O'Neil; Material: Lucite, by du Pont; Fabricator: Keolyn Plastics Company

NOVELTY

VIOLETTE, INCORPORATED

Page 63

The Denta-Kit toothbrush is an ideal traveling companion—a real pal. Molded entirely from plastics, it provides a carrying case, replaceable brush end, and container (in the handle) for a week's supply of tooth powder. Furthermore, it has a sanitary and ventilated closure which fits tightly over the bristles to keep it dry and clean when not in use.

The powder in the handle is made available by flipping the knob at the end in the direction indicated by an engraved arrow. The brush is so perfectly balanced that when laid upon any surface, its bristles always remain upright. The use of acetate allows economy of molding and provides a variety of bright, pastel colors.

Designer: Richard J. Violette; Material: Tenite, by Tennessee Eastman Corp.; Dies and Molding: Chicago Molded Products Corp.; Injection presses: Index Machinery Corp., Reed-Prentice Corporation

AMERICAN STRAP COMPANY, INC.

Page 64

Plastic buckles and slides, made in color to match or contrast with popular leathers, are a boon to those who cannot wear metal because it tarnishes and corrodes. Besides these obvious advantages, these buckles and slides are lightweight, durable, inexpensive and good to look at.

Material: Lumarith molding compound, by Celluloid Corp.; Molder: Universal Plastics Corp.; Equipment: Reed-Prentice injection press

VALDOR, INCORPORATED

Page 65

Several interesting plastics combine to create the dramatic and arresting presentation of Don Juan lipstick. The transparent back shield of the display stand is of luminescent material which appears to be lighted at the letters and around its edge although no artificial means of lighting is used. It simply picks up and reflects surrounding light wherever its surface is cut and left unpolished.

The lipstick container is also plastic combining different types of materials for the three separately molded parts.

Material: Bakelite Polystyrene, by Bakelite Corp., Lumarith, by Celluloid Corp., and Plaskon, by Plaskon Co., Inc.; Molds and Molding: Universal Plastics Corporation

Honorable Mentions

The distinction between a Major Award and an Honorable Mention in Modern Plastics Competition often is slight indeed. In actual fact, the distinction is frequently so infinitesimal that discussions between the judges go on and on until some slender advantage of one entry, or some faulty design of construction or choice of material discovered in another entry, prompts the final decision.

It will be noted, however, that in some groups no Honorable Mentions were given. This is due to the fact that entries in those groups failed to measure up to the high standards of product design and manufacture on which all awards are based. Or, that entries were insufficient to indicate progress and development within the groups during this past year.

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HONORABLE MENTION

1. TO FRESH'ND-AIRE CO. FOR THE ALL-plastic blade in its circulating fan. Through molded plastics, dynamic balance was achieved with light weight, and a trouble-free blade of splendid appearance was the result. The plastic is Textolite, molded by Plastics Dept., General Electric Company

2. TO STAR EQUIPMENT CORP. FOR ITS DRY-cleaning machine agitator in which plastics have replaced cast aluminum with a saving of over 50 percent in weight. The cost saving was even more worth while. The smooth non-abrasive surface of the molded plastic agitator is not likely to become nicked and injure delicate fabrics and garments in the cleaning operation. Also, the material resists the corrosive action of dry-cleaning compounds and caustic solutions making its replacement necessary at less frequent intervals. Two plastic materials are used: Makalot and Bakelite. Tech-Art Plastics Co. did the molding

3. TO DIEBOLD SAFE AND LOCK CO. FOR THE use of plastics in a radically new filing system, called Cardineer. Die casting was considered but rejected in favor of plastics due to the large area of metal distribution, the high cost of a die designed to assure uniformity, and the high cost of durable metal. Final result is a wheel molded in two sections with axle, bearing pins and bolt holes molded in. No finishing is necessary, and the efficient device is in perfect harmony with modern office surroundings. Two plastics are used: Durez and Bakelite. Chicago Molded Products Corp. did the molding. Earl Boughton collaborated with Barnes & Reinecke in its design

4. TO LLOYD DISPLAY EQUIPMENT CO., INC., for its clever use of transparent cast resin in shoe display. Weighted toes hold each shoe as though suspended in space, suggesting the lightness and "walking on air" qualities of fine footwear. Single and double

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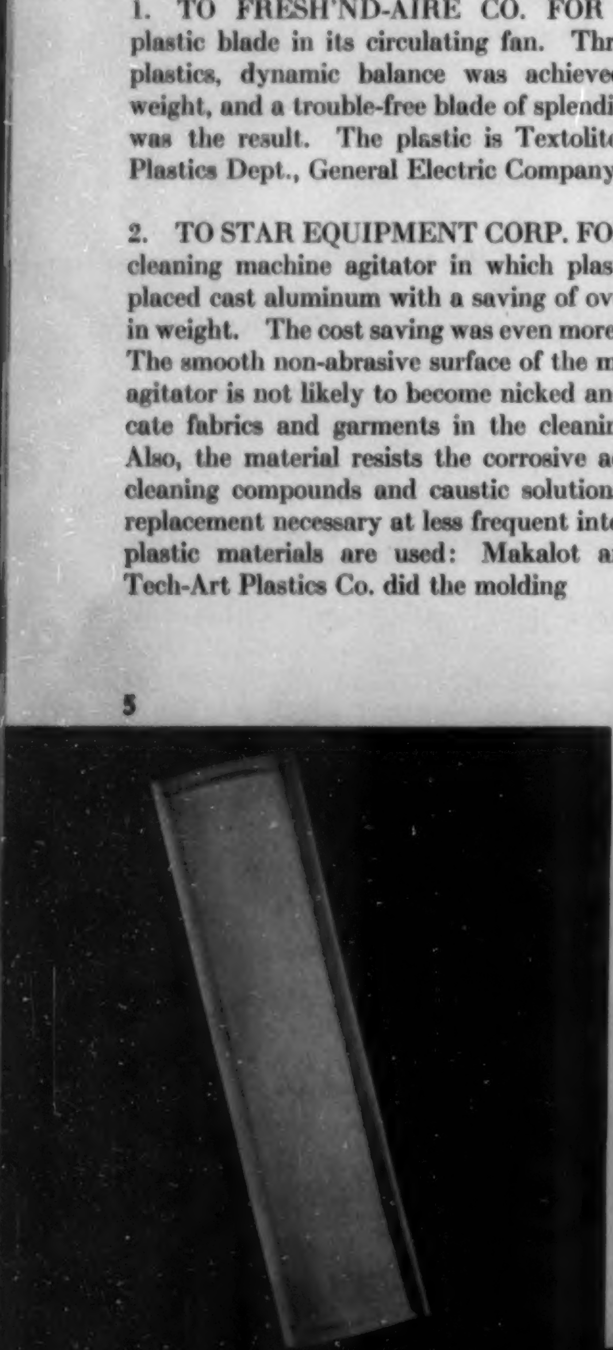

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HONORABLE MENTION

display figures are fabricated from Catalin by Fred Galbas. Simon Matzner was the designer.

5. ALTHOUGH NOT IN PRODUCTION, THIS luminaire for fluorescent lighting, designed by Gilbert Rohde and approved by I. E. S. and Westinghouse Electric & Mfg. Co., introduces a new use for cast acrylic resins in sheet form. It permits maximum light diffusion, is unaffected by cold light and can be economically shaped by hand. Material is Plexiglas, made and shaped by Röhm & Haas Company

6. TO L. H. PHILO CORP., FOR TAKING THE utmost advantage of the ability of tiny cast phenolic buttons to transmit and reflect light in sign illumination. These transparent buttons snap into place, outlining letters in the sign, and give maximum illumination from minimum current consumption. They are made from Catalin by Automatic Button Company

7. TO STEWART-WARNER CORP. FOR OUTstanding functional design of its Air Pal midget radio with a molded urea housing. Smaller than a cradle phone, yet with six-tube performance, Air Pal is light in weight, compact and sturdy. Recessed coral dialing knobs, at each end of the ivory housing, permit a snug fit in its carrying case. Styled by Barnes & Reinecke, the Air Pal is molded of Permo by General Industries Co. on a French Oil Mill Machinery Co. press

8. TO SHAW-WALKER CO. FOR THE NOVEL construction features of short molded plastic sections combined to form a continuous molding around the top of conference and occasional tables to protect the edges, thus assuring permanence of finish at the point receiving the greatest wear. The working surface of the table is a wood veneer bonded to a composition base with waterproof resin adhesive. The plastic parts are Bakelite, molded by Reynolds Spring Company

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HONORABLE MENTION

9. TO THE REPUBLIC BRASS CO. FOR INTRODUCING plastic color in the handles of one of its best selling lines of sink fixtures. These handles are molded over metal cores and are available in colors to match other kitchen utensils. Molded of Bakelite and Tenite by American Insulator Co. on a Reed-Prentice press

10. TO C. K. CASTAING STUDIO FOR EXCELLENCE in rubber mold casting. This technique permits limited quantity production with low mold costs and Mr. Castaing has achieved a surface of high polish comparable to metal molding. He combines a rough surface in pleasing contrast and mounts the entire molding on a black cast base. Cast phenolic used is Marblette

11. TO STOP-DRIP CO., INC., FOR DEVISING A sure quick cut-off closure which cannot drip. Plastics were used to provide color and because they are easy to clean and will not tarnish. They match or contrast pleasingly with glass or pottery syrup servers. Plastic parts are molded of Tenite by Modern Plastics Co. on a Reed-Prentice Corp. injection molding machine

12. TO PRESTO DUAL SHAKER SALES CO. FOR devising a practical combination shaker which delivers either pepper or salt as desired by simply pressing its sides. It is neither too small nor too large and is easy to fill and keep clean. When not in use, the pepper compartment is sealed to preserve its full strength and flavor. Light colors are Beetle, dark colors are Makalot, molded by Globe Tool & Molded Products Co. Edward Richter was the designer. Peerless Mold & Machine Co. made the molds

13. TO PRACTICAL PRODUCTS CO. FOR ITS Sani-Way toothbrush holder which provides a sanitary parking space for toothbrushes for all the family. It is quickly attached to any wall with a simple but rugged device which permits its removal for cleaning. Designed by Barnes & Reinecke, it is molded of Plaskon by Chicago Molded Products Corp. (See also page 88)

14. TO THE HAYS CORP. FOR ITS MOLDED transparent Orsatomat (automatic gas analyzer) which permits the operator to watch the analyzing process.

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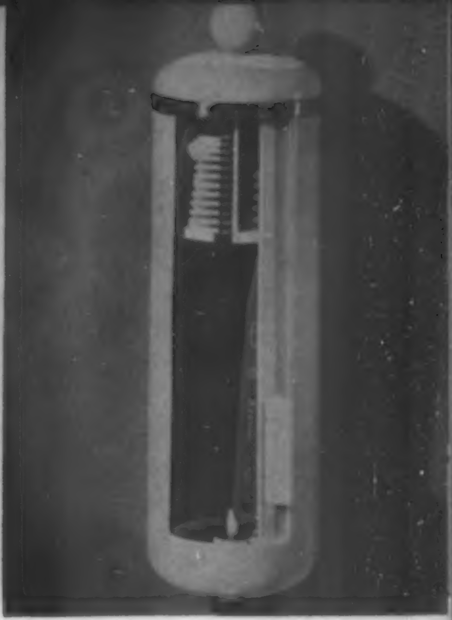

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HONORABLE MENTION

Molded of Lucite, it is practically unbreakable, unaffected by chemicals, is light in weight, can be permanently sealed without gaskets and permits economies in manufacture. The Orsatomat is molded by Modern Plastics Corp. Molds are by Victor Tool Company

15. TO CURVLITE PRODUCTS, INC., FOR revolutionizing the instruments used in the operating and diagnostic lighting field. The instruments are shaped from Plexiglas rods and pipe cold light to the exact spot of examination without danger of shattering in use. The plastic material is fabricated or shaped in the company's own plant. Edwin A. Neugass was the designer. Molds are by Conrad & Moser

16. TO THE PEDLER CO. FOR THE DRAMATIC use of clear plastic in the musical instrument field. The Lucite mouthpiece, molded by Elmer E. Mills Corp., on a Reed-Prentice Corp. injection press, is the result of more than two years' experimentation and trial to develop this transparent clarinet, the most essential and popular of all woodwind instruments

17. TO HUDSON MOTOR CAR CO. FOR ITS USE of a Lucite lens which magnifies the odometer numerals so they may be seen by the driver at all times. The odometer lens, designed by Arthur H. Kibiger in collaboration with Frank S. Spring, is molded by Watertown Mfg. Co. on a Reed-Prentice Corp. injection press. It is also worthy of note that the attractively designed Hudson instrument panel has a speedometer and clock lens of Lucite molded by Norton Laboratories, Inc. Gemloid is used for the speedometer panel. Molds are by Alexander Primas

18. TO THE PLASTIC DIVISION OF WATERbury Button Co. for quickly providing the American imitation jewelry industry with plastic jewels to replace the European supply of glass stones when the supply was cut off. It is difficult indeed to mold plastics with the high luster this company has achieved through a technique called *Transplastic*. As the result of this process plastic jewels of equal or better brilliance are obtained in rapid production at favorable prices. Bakelite Polystyrene is the plastic used

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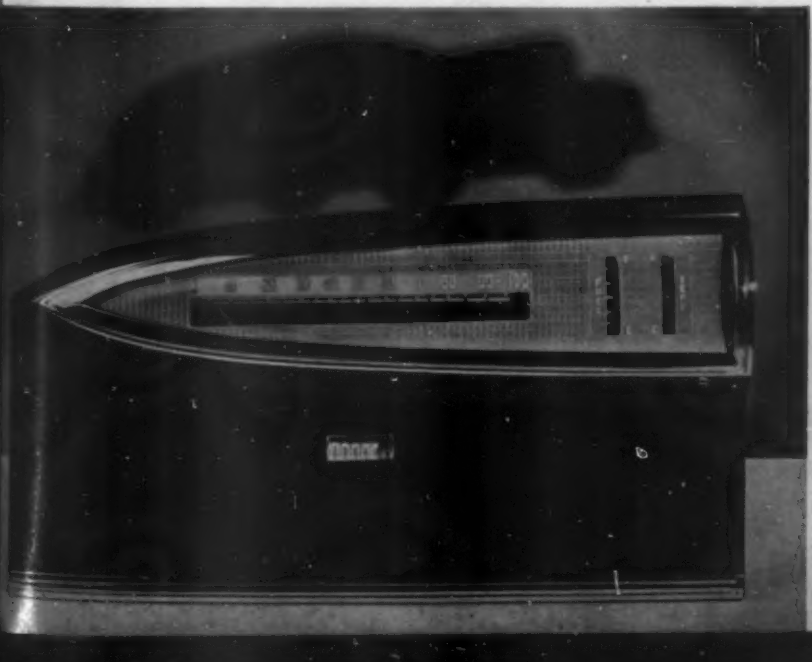

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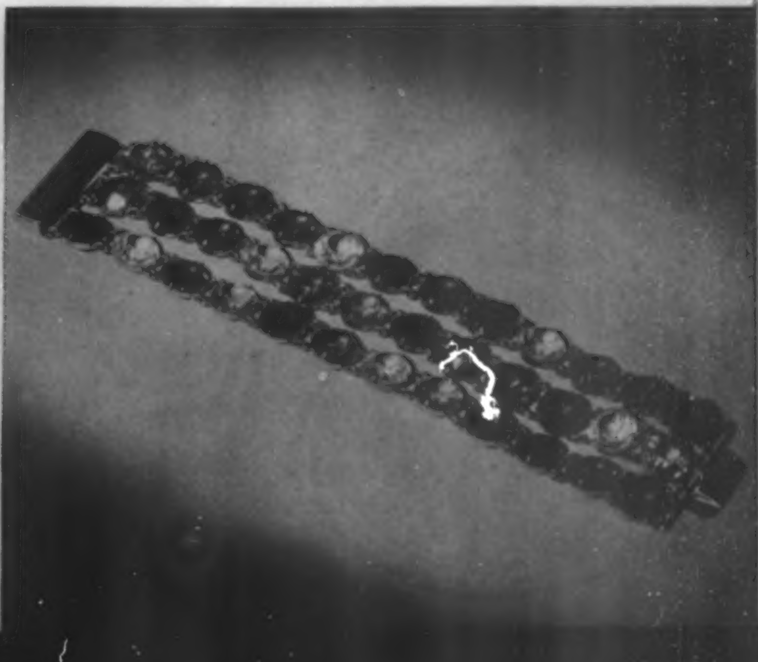

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HONORABLE MENTION

19. TO STANDARD GARMENT CO. FOR ITS Skid-Fastener which happily combines the smart appearance of plastic buttons with the rapid manipulation possibilities of the zipper. The fastening principle is entirely new and Marblette was the material chosen because of its brilliant color and ability to clean or launder without shrinking. Being made of cast phenolic material, these bright buttons will not melt or burn if touched accidentally with a hot iron

20. TO JOSEFF, OF HOLLYWOOD FOR HIS FINE creations in costume jewelry. Through intelligent choice of plastic color, combined with precious metals, and superb design, Joseff has introduced costume jewelry worthy of the approval of the most exclusive retail establishments in the country. Each piece is substantially assembled and permanently fastened by hand. Leaves and flower petals are not paper-thin; metal pins or clips in the back are firmly attached. Merrigan Plastics did the molding using Tenite. Equipment used includes machinery built by George Gorton Machine Co. and plastic injection molding machines made by Reed-Prentice Corporation

21. TO SOCAL MANUFACTURING CO. FOR ITS use of plastic molded parts in this Golden Gate Bridge, a *Konstructos* toy. Ellis E. Bjorling made the original model in wood which Foreste E. Devel translated into plastic. Windman Bros. molds them of Bakelite for the educational amusement of thousands of youngsters who may build our bridges in the future

22. TO JOHN SAMUELS WHO ADDS JOY TO the Saturday night game of poker by providing colorful transparent chips inlaid with metallic design or individual monograms. Molded of Bakelite acetate by the Burt Co. from molds built by H. Loeffler & Co., these chips stack and slide without tumbling because they are designed with milled ribs like professional chips

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HONORABLE MENTION

23. TO W. L. STENSGAARD & ASSOCIATES, Inc., for the unique use of fluorescent Monsanto sheet acetate in constructing a series of Marine Garden displays which appeared recently in the windows of Saks Fifth Avenue, New York. Designed by Findley Williams, these striking exhibits, each eleven feet high, were made of individual pieces, carved and assembled by hand. A specially prepared material was used which edge-lights without artificial illumination wherever its surface is cut or engraved

24. TO CHICAGO MUSICAL INSTRUMENT CO. for its Aman Recorder, designed by Frank Aman and molded of Durez by Van Norman Molding Co. The plastic material proved better than wood because it is dimensionally stable when subjected to moisture blown into the instrument by the musician, thus retaining acoustical properties satisfactorily. Also, the plastic is more economical to use than wood. Rugged construction and easy-to-clean surface make it practical for musical instruction of youngsters

25. TO MULTICOLOR WATCH CO. FOR CREATing a colorful, practical watch case for sports wear. From clear transparent, through the gamut of fashionable fabric and accessory colors, this company hand fabricates these cases from Marblette. Standard watch movements are inserted behind a sliding back cover which protects them from dust and moisture. They were designed by Roland Descombes

26. TO R. M. HAY CO. FOR ITS BALL RING AND other safe and colorful toys for tiny tots. Fashioned from Catalin, these playthings are sanitary, easy to clean, and practically unbreakable in use. They were designed by Ruth B. Cornette to inspire the youngster at various stages to experience the sense of movement. Color and sound combine to attract attention and provide harmless amusement. Odorless, tasteless, these toys will not chip or peel, and the smooth rounded edges are easy on baby's mouth and fingers. There is nothing to break or swallow

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PHOTOS AND COLOR PLATES, COURTESY TENNESSEE EASTMAN CORP.

A radical departure in arms manufacture the Stevens shotgun (above) features a plastic gun stock, fore-end and sight-piece, all molded of Tenite by Specialty Insulation Mfg. Co. Special variegated color and ingenious extrusion molding achieves the smooth surface effect of burled walnut. At the right, Frank R. Kelley, All-American skeet captain and winner of more than 50 championships, is pictured demonstrating this new gun

UP IN ARMS

Light and tough, without grain, plastic gun stocks supplant wood

THE J. STEVENS ARMS CO., ONE OF THE COUNtry's largest producers of guns, has broken away from the traditional use of wooden stocks and announced a double barrel shotgun with plastic stock and fore-end. In their words, "Long, thorough testing, in our engineering and research departments and in the field has conclusively proved that this is an ideal material for gunstocks." A special formula was developed which, in service tests, has proved even more durable than wood for this purpose. It has lower moisture absorption, greater resistance to shock and vibration, and the same smooth, grained surface effect of fine walnut burl with a hand-rubbed oil finish.

Wood, despite its years of acceptance and service as a gun stock material, has certain limitations which cannot be overcome. The source of supply, for example, is a variable factor at best. It takes years for a walnut tree to grow to a size where it can be used for gun stocks. The tree must then be carefully selected in the field before it is logged and milled. Kiln drying is perhaps the most important process of all in the preparation of the wood. A piece of sufficient size and thickness for a gun stock must be dried very gradually and under the most rigidly controlled conditions of temperature and humidity. Otherwise, it will crack in the process and have to be rejected. Generally speaking, a period of weeks is required to dry the piece properly for fabrication. The grain of the wood determines, to a large extent, the way in which it must be carved. It has been found that maximum strength in a stock is obtained by carving it so that the grain runs parallel to the grip. Even the most precise care in processing and designing, however, does not eliminate all of the troublesome characteristics of wood as a gun stock material. It has a tendency to split or crack, usually along the grain, under the repeated shock of firing, and when subjected to extremes of weather conditions.

During the last century, arms manufacturers have been experimenting with all types of synthetic materials in the hope of finding one that would be superior to wood—one with all of its advantages and none of its disadvantages. Cellulose acetate is the first synthetic material to prove satisfactory. It has no grain and is tougher and stronger than wood.

The first tests made were to determine the resistance of the material to the repeated shock of firing. A shotgun, equipped with the new plastic stock, was clamped in a shooting jack with the shoulder (*Please turn to page 128*)

An amazing translucent plastic framed the Perfume Displays in the French Pavilion at the New York World's Fair. The material is Cristaplem, a cellulose acetate formed in a plaster of Paris mold

NEW ACETATE TECHNIQUE

by SANFORD L. WILLIS*

VISITORS AT THE FRENCH PAVILION IN THE New York World's Fair admired the decorative effects, which, as much as anything else, made the perfumery and jewelry exhibits outstanding. In the case of those having knowledge of plastics molding technique, however, admiration quickly gave way to wonder regarding the materials and methods employed to produce the wide variety of shapes and textures shown.

There was a one-piece wall panel some 250 sq. ft. in area with surface sculptured in infinite detail. Also, a 9 ft. statue exhibited the same faithful perfection of surface and detail, while round about were to be found a wide variety of smaller pieces ranging all the way from self-supporting decorative arches to wall medallions and frames enclosing inset display cabinets.

A casual examination disclosed that all of the pieces were shaped in some sort of a mold, but that, while the inside or back surfaces conformed to the mold surface to an extent assuring uniform thickness throughout the piece, they were pebbled and not produced by mold contact.

The puzzle becomes more complex when one learns that the material used throughout the exhibit was cellulose acetate, a material generally associated with compression and injection molding methods and equipment in much smaller applications. It was also observed that in spite of the wide temperature variations caused by the interior and back panel illumination there was no distortion. The panel and statue are highly translucent and present a striking appearance under the influence of transmitted light.

A start toward the explanation may be obtained from the card attached to the exhibit. This informed the reader that the product is manufactured by Mergier & Leroy, a Parisian firm specializing in the molding of manikins and art objects.

Recourse to the French patent files discloses that a patent was recently issued to Mergier & Leroy describing

* Product and Market Consultant.

a new molding process in which a mixture of plastic grains in a viscous solution of the same or a compatible plastic is applied to the surface of a plaster of Paris mold. The patent states further that, thanks to the high solids content of the mixture, setting occurs without loss of solvent, and that this is subsequently completely eliminated without surface rupture or distortion.

Evidently, if the major premise is sound, the process can be employed with any natural or artificial resin or resinoid which is solvable in a volatile solvent with formation of a viscous, colloidal solution, and in fact, inquiry of the inventors brought forth the information that they have employed all of the known thermoplastics, and have obtained very encouraging results using certain of the ureas and phenols. They advise also that the grains used may be loaded with inert material up to 60 percent of finished product weight although heavy loading materially reduces the tensile strength of the resulting product.

The surface and texture characteristics of the material as disclosed by available examples differ radically from those obtainable with press molding, but on the other hand it is possible to obtain surface patina and textures which press molding cannot approach. Here are marbles, alabasters and nacre effects in infinite variety, all of which can be produced and controlled at will.

The mold cycle is slow, ranging from an hour or two in the case of thin shells to a day or more for thick sections. Since, however, thin sections—say 1/8 in.—can be employed for most markets, the short time cycle may be considered representative of usual procedure. This handicap is not serious, in view of the fact that the molds are plaster and therefore cheap; the labor factor except in the case of special pieces is low; and no expensive process equipment is required. Given a tank for mixing solutions, roller conveyor for transporting molds, and adequate floor and shelf space for product curing and mold storage, commercial production can be started.

The writer has just concluded a series of tests in an effort to check the inventors' claims and to determine various points relative to process technique not disclosed in the French patent. Several of the results obtained are most interesting.

There is no doubt that the mixture of solution and grain sets exactly as described in the patent, and when the grain used is fine, it is very rapid. The setting takes place immediately even though the mold and contents are placed in a concentrated *(Please turn to page 122)*

The heroic figure and huge screen of the Perfume Exhibit is also Cristaplem. This sectional photograph shows the interesting translucence of the material when back-lighting is employed

A MOUTHFUL OF PRAISE

MOLDED PLASKON is a thoroughly sanitary material—tasteless, odorless, inert. Therefore, it is the ideal plastic for containers of foods, cosmetics and related products.

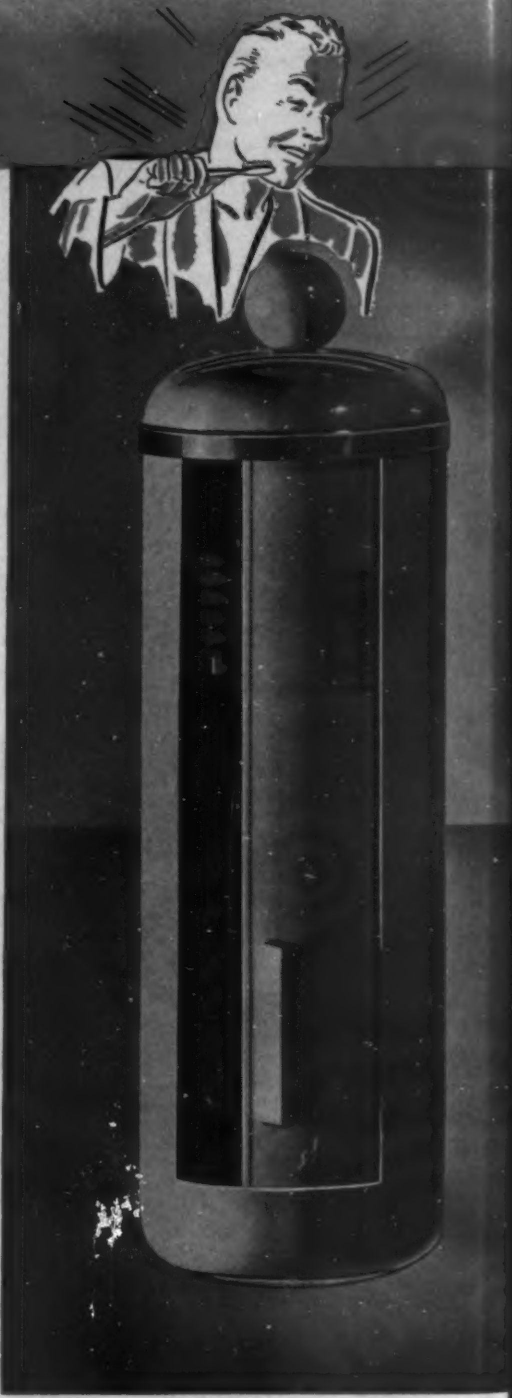
It is both a compliment and a coincidence that in the Fourth Annual Modern Plastics Competition, the judges selected three items that are being molded of Plaskon because of its recognized sanitary properties.

Molded Plaskon resists solvents. It is impervious to oils and greases. It can be immersed in alcohol and acetone for indefinite periods of time without harmful effect or bleeding of color.

Molded Plaskon is non-porous. It will not absorb odors or flavors. The surface is hard, easy to clean. Being solid molded color, the finish is permanent. Scratching or abrasion do not impair its color value.

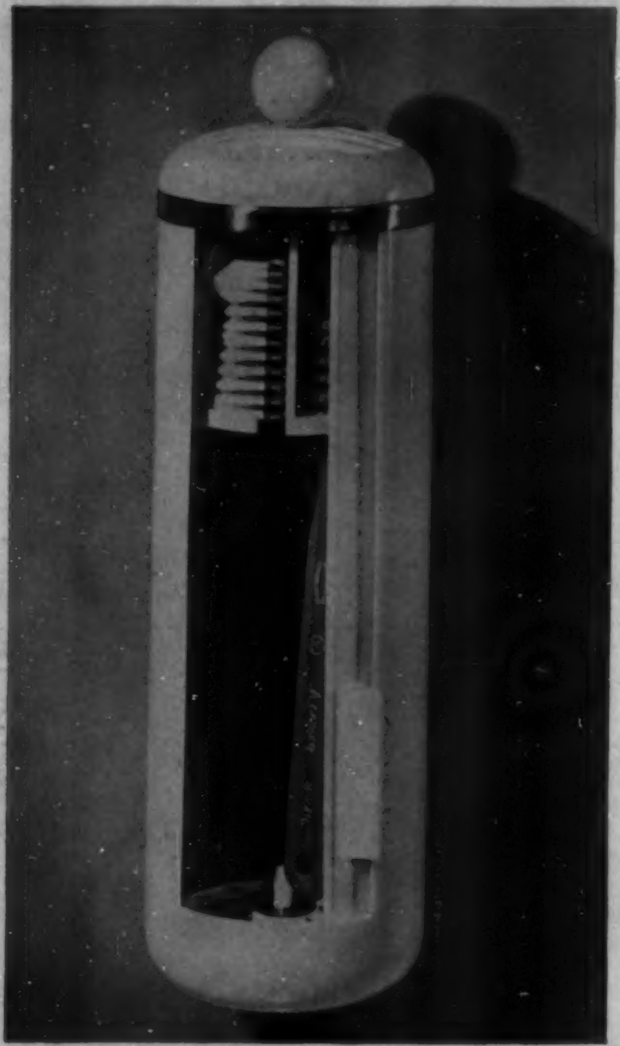
If your product is such that you can take advantage of these remarkable qualities, be sure to investigate Plaskon, world's largest selling urea-formaldehyde plastic. Consultation entails no obligation.

PLASKON COMPANY, Inc.
2121 SYLVAN AVE. • TOLEDO, OHIO
Canadian Agent: Canadian Industries, Ltd., Montreal, P.Q.



Sani-Way Tooth Brush Holder, produced by the Practical Products Corp., Indianapolis. Won Honorable Mention in Household Group. Designed by Barnes & Reinecke, 664 N. Michigan Ave., Chicago, and molded by Chicago Molded Products Co.

EVERY MORNING AND NIGHT



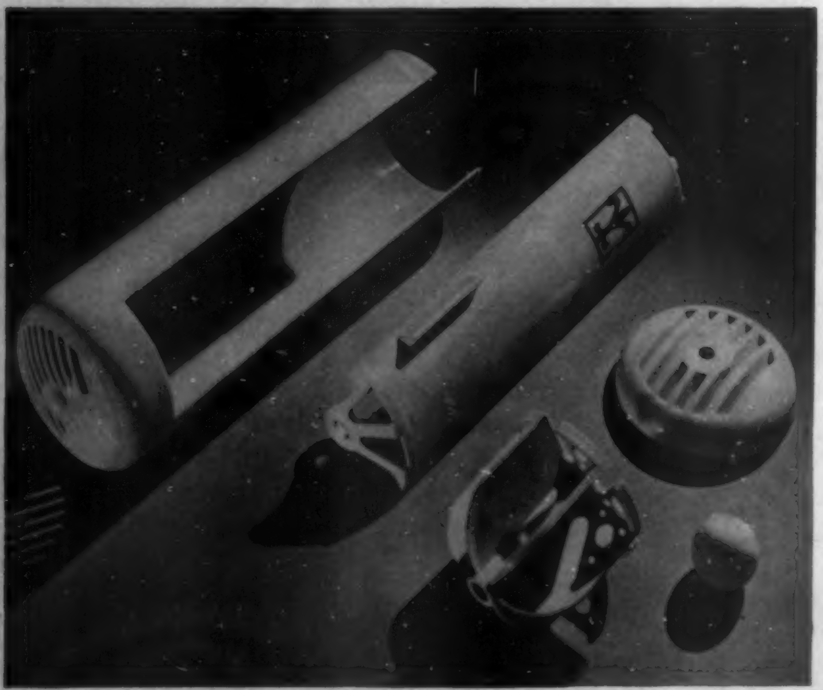
PARKED IN A NOVEL PLASTIC TOOTHBRUSH garage, the entire family's brushes are kept sterile, dry and dust-free. Awarded Honorable Mention in the 1939 Modern Plastics Competition (See page 78), the handsome molded ivory urea holder is sanitary both in appearance and function.

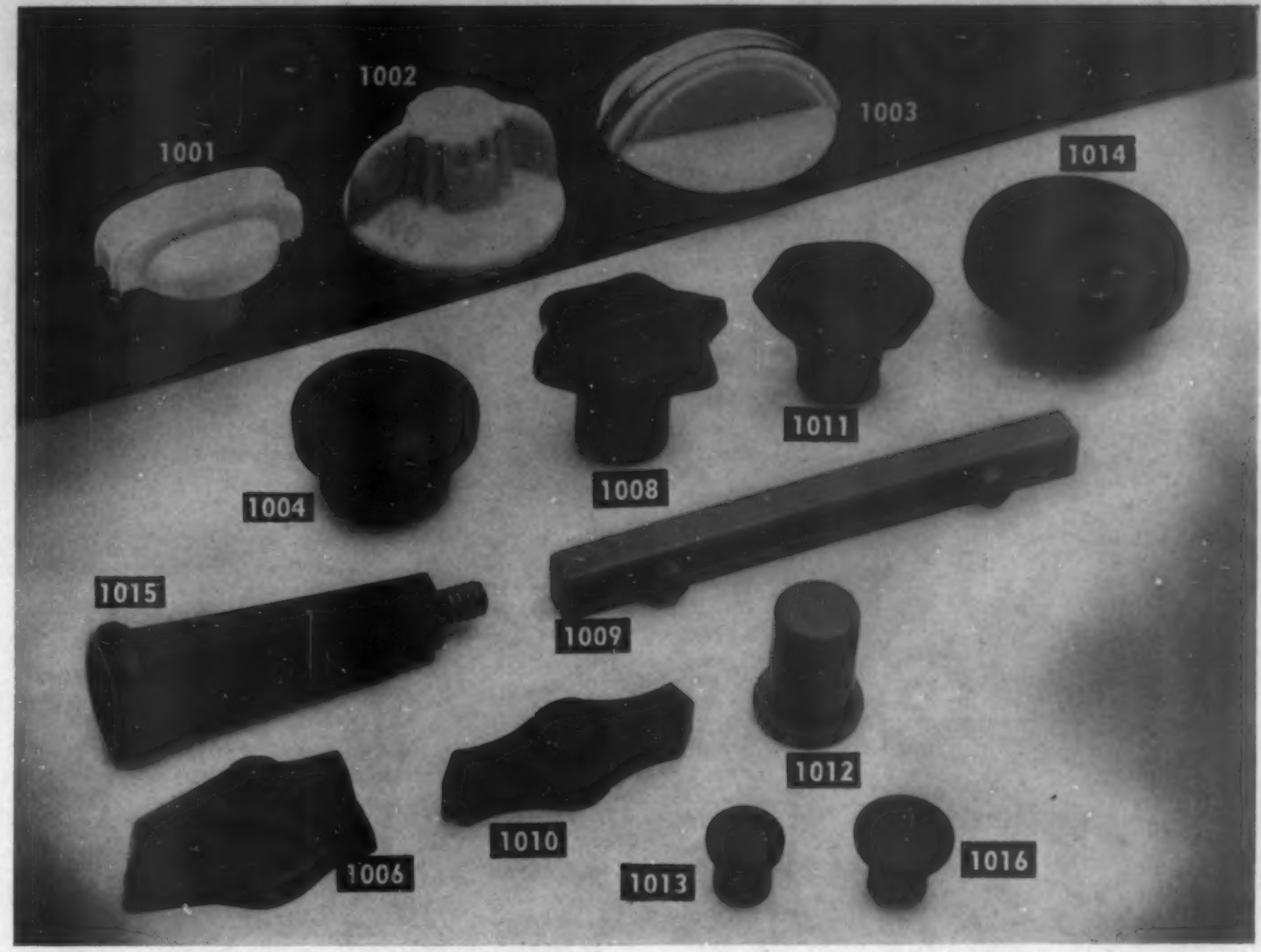
Practical Products Company, its sponsors, are pointing rather proudly to this new holder, which accommodates six brushes, because of its modern but restrained design. The clean lines are definitely emphasized by the intelligent combination of plastics with metal. A stainless steel band and inlaid fleur-de-lis comprises the metal decoration with startling contrasting effect.

A simple law of air convection is employed to dry the brushes. The open-louvered top and bottom creates an air movement that is magnified by the chimney-like interior construction of the holder. A simile between a chimney, elevator shaft or long hallway would not be out of place in describing this elementary action. Ingenious insertion of non-rusting filters and a replaceable antiseptic cake provides for purity and cleanliness within.

A plastic flange on the rear fits into a metal bracket supplied with each holder. The bracket is mounted on the wall or trim and allows the holder to be quickly taken down or removed for washing and cleaning. Knob at top turns the wanted brush to the front in a jiffy.

Open and closed views of the Sani-Way toothbrush holder recently introduced by Practical Products Co. Open louvers scientifically promote ventilation and drying. An antiseptic chemical cake purifies the air. Five molded parts comprise the sanitary mechanism. Designed by Barnes & Reinecke, the moldings are of Plaskon by Chicago Molded Products Corporation





Sheet One to Fifty-Two reprinted in book form, twenty-five cents in coin or stamps

Stock Molds

SHEET EIGHTY-SEVEN

Control levers, gas cock handles, knobs, pulls, etc., for many useful, decorative purposes are available without mold cost from stock molds. Address Stock Mold Department, Modern Plastics, Chanin Building, New York, N. Y., giving item and sheet numbers

1001. Round white gas cock handle with metal thread, 1/4 in. in diameter. Decorative molded ridge, 1/2 in. wide. Overall length, 1 5/8 in.; 1 1/4 in. high

1002. Ivory directional gas cock handle with fluted knob. Words "on" and "off" molded in. Overall length, 1 13/16 in.; 1 in. high

1003. Round ivory gas cock handle. Decorative curved metal stripe, 1/4 in. wide. Overall length, 2 in.; 1 3/8 in. high; 3/8 in. opening

1004. Decorative knob, 3/16 in. metal thread. Overall diameter, 1 3/8 in.; 3/4 in. high

1006. Control lever, opening 3/16 in.; Length 1 5/8 in.; 3/4 in. high.

1008. Hexagonal gas cock handle with directional arrow molded in. Diameter across points, 1 1/2 in.; 1 in. high

1009. Pastel colored pull, 4 in. long by 3/8 in. wide by 5/16 in. 2 5/16 in. between 3/16 in. metal threads. Fitted with two molded shoulders.

1010. Control lever with three openings at bottom. Overall length, 1 3/4 in. 1/2 in. high. Through center, 3/16 in. in diameter

1011. Hexagonal knob with 3/16 in. metal thread. Overall diameter, 1 3/4 in.; 7/8 in. high

1012. Red push button with 1/4 in. opening at bottom. Overall length, 15/16 in.; 7/8 in. high

1013. Round knob with metal thread, 3/16 in. in diameter. Overall diameter; 5/8 in.; 7/16 in. high

1014. Round knob with metal thread, 3/16 in. in diameter. Overall diameter 1 3/4 in.; 7/8 in. high

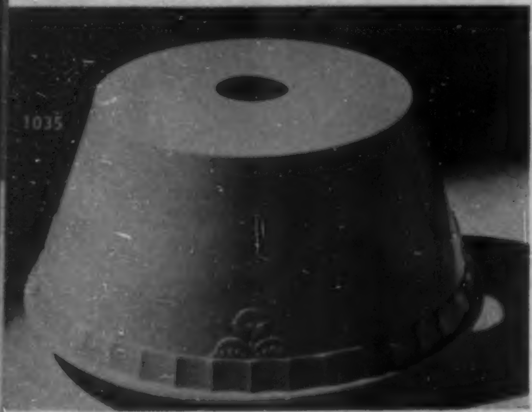
1015. Ridged pendant handle, with opening at top, 5/8 in. in diameter. Overall length 2 5/16 in., plus metal screw, 7/16 in. long

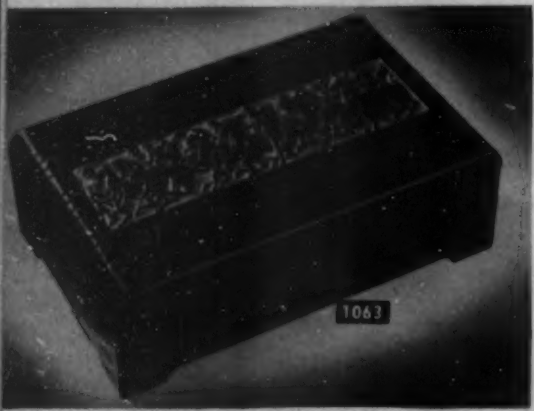
1016. Round knob with metal thread, 3/16 in. in diameter. Overall diameter 5/8 in.; 1/2 in. high

Stock Molds

SHEET EIGHTY-EIGHT

Many stock mold boxes, trays, lamp shades, available without mold cost, may be used for advertising novelties, premiums, gift packages and general utility. Names and addresses of molders will be supplied on request





996. Desk tray, combining ash tray and pen, clock or calendar stand, 9 7/16 in. long, 5 3/16 in. wide, 1 1/8 in. high. Inside diameter of ash receptacle, 4 in. Decorative metal insert is molded in

1035. Ivory lamp shade or reflector, of translucent washable plastic. Overall diameter, 9 1/4 in.; diameter of top, 6 1/8 in. Outside height, 4 5/16 in; inside height, 4 1/4 in. Weighs 6 1/2 ounces

1063. Box with molded hinges, 8 1/2 in. long, 5 5/16 in. wide, 2 9/16 in. high. Molded feet at corners project 1/4 in. below base. Decorated with horizontal stripes filled in with color, and classical bas relief design, 2 in. by 7 1/4 in. long, with colored background

1064. Rectangular tray with rounded corners and reinforcing ribbing at bottom. Overall dimensions 15 1/16 in. by 7 3/8 in. by 5/8 in. high. Molded handles extend 3/8 in. Inside dimensions, 14 in. by 6 1/4 in. by 7/16 in. deep. Weighs 10 1/2 oz. Available in mottle or solid colors

1065. Rectangular tray with rounded corners and one curved side. Has reinforcing ribbing at bottom. Weighs 11 oz. Available in mottle or solid colors. 12 15/16 in. at longest part, tapering to 11 7/8 in.; 9 3/4 in. wide and 1/4 in. deep

1066. Rectangular tray, same as 1065, but 13 1/8 in. long tapering to 11 3/4 in.; 10 7/8 in. wide and 1/4 in. deep. Weighs 11 ounces

1067. Heavy rectangular tray with thick reinforcing ribbing at bottom. Weighs 1 lb. 7 oz. Overall dimensions, 11 7/16 in. long, 7 13/16 in. wide and 3/4 in. high; 3/4 in. inside depth

All molders are invited to send samples from stock molds to appear on this page as space permits

Sheets One to Fifty-Two, reprinted in book form, twenty-five cents in coin or stamps

COLD FLOW OF THERMOPLASTIC MATERIALS

by C. H. PENNING AND L. W. A. MEYER*

WHILE MANY ARE THE SEEMING MIRACLES performed in the field of plastics, it remains quite true here as in other lines of endeavor that "You can't eat your cake and have it too." Science has not yet found and probably never will find the "perfect" plastic. In thermosetting materials we usually have low resistance to impact and in thermoplastics low resistance to heat and pressure—both, of course, in varying degrees, according to the composition of the material in question. These and other properties must essentially differ in different applications, and no one product can be expected to meet all specifications.

The yielding of thermoplastic materials under pressure at elevated temperatures is termed *flow;* this is the function which enables the material to be molded into the desired shapes. In order to retain its shape the molded thermoplastic article must be cooled. Ordinarily, the lower the temperature the more difficult it is to distort the piece. However, under sufficient sustained pressure thermoplastic products will flow even in the cold, thus giving rise to the characteristic known as *cold flow*.

Bell Telephone Laboratories' equipment for measuring cold flow of insulating materials is described and illustrated in an article by Burns and Hopkins.[1] Using this method, which involves essentially the measurement of the percentage decrease in height of a 1/2 in. cube held for 24 hrs. at 120 deg. F. between parallel plates under a load of 1000 lbs., the following typical values were obtained by those writers:

Material	Cold flow percent
Ebony asbestos	0.2
Phenol plastics	0.4
Urea plastics	0.4 to 7
Cast phenolics	10.0
Hard rubber	0.5 to 80
Vinyl plastics	1.0 to 32
Acrylic resins	1.0 to 50
Polystyrol	2.0 to 22
Cellulose acetate plastics	2.0 to 64
Benzyl cellulose	76.0

The great variation indicated for each of the thermoplastic materials is, of course, due to differences in formulation. In any one type of thermoplastic composition the formula may be varied by changes in the basic composition and by using different plasticizers. Variation in degree of flow in any one formula is accomplished most readily by changing the percentage of plasticizer incorporated. The greater this percentage, the softer the flow. The word *flow* as here used applies to action during the molding operation at elevated temperatures; *cold flow* means displacement at room or lower temperatures.

In order to investigate this wide spread shown in the values for thermoplastics, a series of cellulose acetate compositions differing only in plasticizer content was studied. Tests were run with weights of 200, 400, 600, 800 and 1000 lbs. on the parallel plates. Since the test specimens were 1/2 in. cubes, the pressures on the material in lbs. per sq. in. were four times the above

Additional material at the slot and ribbing at regular intervals, strengthens this ciné reel core and decreases possibility of cold flow of the molded thermoplastic. (All photos, courtesy Tennessee Eastman Corporation)

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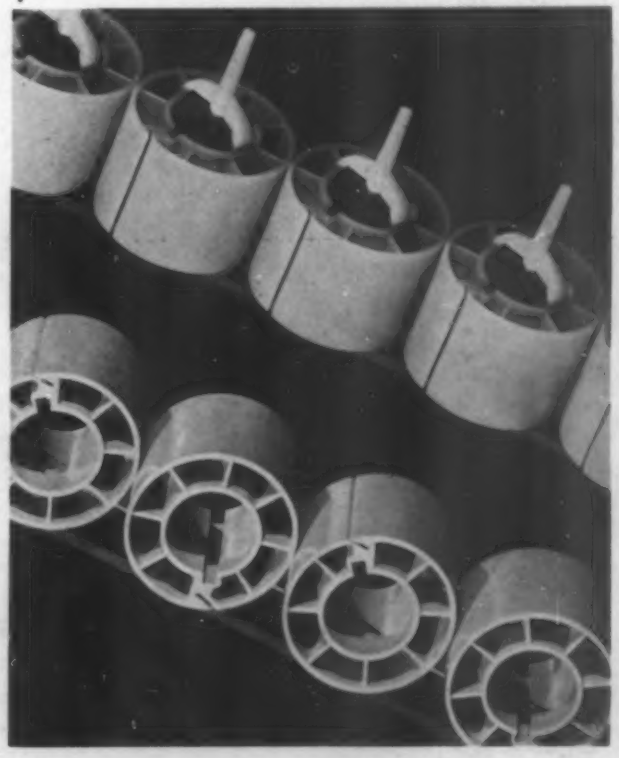
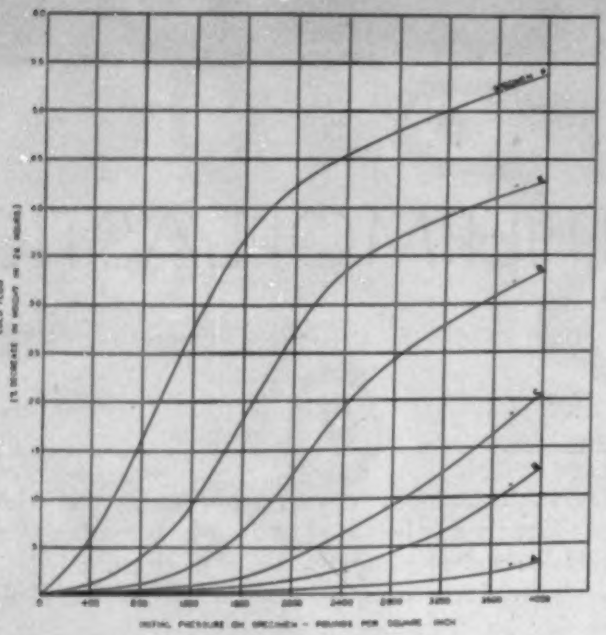


* Tennessee Eastman Corp.
[1] Modern Plastics, Vol. 14, No. 12, p. 42 (August 1937).

EFFECT OF PRESSURE ON COLD FLOW OF THERMOPLASTICS



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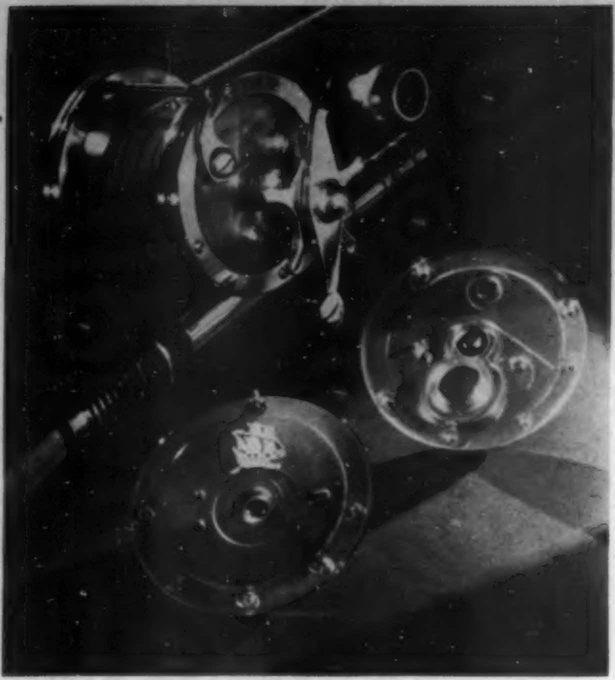

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This fishing reel end illustrates the use of metal inserts to remove stress and strain from the plastic, strengthening the sections subject to cold flow

values at the start of the tests. The specimens were at room temperature when placed in the machine; the machine was set in a cabinet which maintained it at 120 deg. F. during the entire period of the test except for the short period at the beginning when the specimen was inserted and the load applied. The experimental values obtained are shown in Table I.

Table I—Cold Flow of Dry Cellulose Acetate Compositions
Under pressure 24 hours at 120 deg F.

Specimen	Molding flow range of of specimens	Cold flow — Initial pressure in pounds per sq. in. 800	1600	2400	3200	4000
		percent	percent	percent	percent	percent
A	Hard	0 .15	0.55	0.79	1.55	3.05
B	|	.45	1.29	2.84	5.89	14.50
C	to	.58	1.69	6.50	13.75	20.70
D	|	1.05	5.66	19.83	27.36	33.10
E	|	3.81	18.30	34.45	39.15	41.85
F	Soft	16.50	35.60	45.80	49.98	53.02

The data for specimens tested have been arranged in descending order of molding flow temperature of the specimens as determined with a Rossi-Peakes Flow Tester. The molding flow temperature is defined as the temperature in deg. F. at which a standard dry specimen (3/8 in. in diameter and 3/8 in. long) will flow 1 in. in 2 min. into a 1/8 in. cylindrical orifice when under a pressure of 1500 lbs. per sq. in., the specimen at room temperature having been charged into the hot mold chamber and the pressure applied immediately.

The data of Table I are plotted in Fig. 2, with the initial pressure as abscissa and the cold flow as ordinate. From a study of these curves, it is quite clear that after the specimens have decreased in height by 15 to 20 percent the surface areas in contact with the plates increase rapidly, thereby slowing down the cold flow and consequently changing the direction of the curves. Obviously, as the surface area under compression increases, the actual pressure per square inch decreases, accounting for the effect noted above. For this reason cold flow values below 20 percent should not be compared directly with values over 20 percent, because the actual differences in the compositions are greater than shown by the values given by this method.

In obtaining the above data, it was noted that the greater portion of the cold flow takes place during the first part of the test. This is also indicated by a graph on cold flow appearing in an article on injection molding by Grenquist.[2] Therefore, readings were taken at 6 hrs. as well as 24 hrs. The data shown in Table II (following below) were obtained.

Table II—Cold Flow of Dry Cellulose Acetate Compositions
Under pressure 6 hours at 120 deg. F.

Specimen	Molding flow range of specimens	Cold flow — Initial pressure in pounds per sq. in. 800	1600	2400	3200	4000
		percent	percent	percent	percent	percent
A	Hard	0.10	0.32	0.53	1.15	1.99
B	|	.39	.98	1.98	3.76	10.00
C	to	.45	1.11	4.71	10.85	18.20
D	|	.55	4.56	17.52	25.16	30.70
E	|	2.31	15.22	32.40	37.15	41.30
F	Soft	13.42	33.20	43.84	48.10	51.20

The difference between the 6-hr. and the 24-hr. reading is small in all instances. In view of the fact that values above 20 percent are useless for comparisons, as mentioned above, it is considered that the 6-hr. period is adequate for these tests.

[2] Modern Plastics, Vol. 16, No. 2, p. 162 (October 1938)

Effect of moisture on cold flow

Moisture content has an important bearing on cold flow properties. To show this, tests were run just as before except that instead of drying the specimens they were conditioned for one week at 40, 80 and 100 percent relative humidity. With a weight of 400 lbs. on the plates (initial pressure of 1600 lbs. per sq. in. on specimen), the results shown in Table III were obtained.

Table III—Cold Flow of Conditioned Cellulose Acetate Compositions

(Under initial pressure of 1600 lbs. per sq. in. for 6 hrs. at 120 deg. F.)

Specimen	Molding flow range of specimens	Cold flow			
		Relative humidity of conditioning atmosphere			
		Dry	40%	80%	100%
		percent	percent	percent	percent
A	Hard	0.32	0.55	3.88	7.50
B	|	.98	1.95	9.75	26.80
C		1.11	2.48	18.34	37.60
D	to	4.56	8.07	35.00	52.50
E	|	15.22	25.04	49.30	57.50
F	Soft	33.20	39.00	55.00	62.30

Cellulose acetate butyrate compositions have lower moisture absorption than do cellulose acetate compositions. Comparative results for cellulose acetate butyrate are shown in Table IV.

Susceptibility to cold flow indicated by other physical properties

Definite indications of the susceptibility of thermoplastics to cold flow are given by data on tensile strength, elongation, compressive strength and flexural strength. Other factors being equal, the material having the

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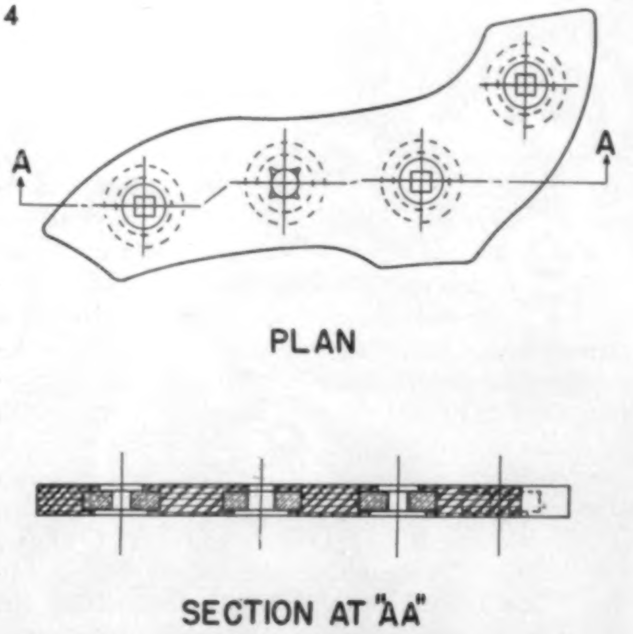


TENITE SAW HANDLE

Table IV—Cold Flow of Conditioned Cellulose Acetate Butyrate Compositions

(Under pressure of 1600 lbs. per sq. in. for 6 hrs. at 120 deg. F.)

Specimen	Molding flow range of specimens	Cold flow			
		Relative humidity of conditioning atmosphere			
		Dry	40%	80%	100%
		percent	percent	percent	percent
G	Hard	0.40	0.93	1.58	2.47
H	|	0.72	1.86	3.10	4.92
I		1.30	2.73	4.69	10.20
J	to	2.94	5.70	11.38	22.41
K	|	5.63	10.80	20.82	32.10
L	Soft	18.00	26.18	35.14	43.20

highest tensile, flexural and compressive strengths and the lowest elongation will have the least cold flow. Unfortunately, it is likely also to have the lowest strength in resistance to impact. Comparative figures for two formulas of cellulose acetate plastic, both of the same molding flow temperature (280 deg. F.) follow:

	Formula I	Formula II
Elongation, percent	33.1	7.1
Tensile strength, lbs. per sq. in.	4,300	7,200
Flexural strength, lbs. per sq. in.	6,400	13,300
Compressive strength, lbs. per sq. in.	12,000	23,200
Impact strength, ft. lbs. per sq. in. (Charpy)	21.4	10.2
Cold flow (under pressure of 4000 lbs. per sq. in. for 24 hrs. at 120 deg. F.), percent	51.5	23.5

Compare the data on the same measurements for Formula I with those on material of the same composition but with a lower plasticizer content and, therefore, a higher flow temperature (350 deg. F.): (*Please turn to page 124*)

Fig. 4 shows the placement plan for metal inserts in the molded saw handle (5). Taking direct stress at any one point, they distribute it over a considerable area, and also fasten molded pieces to other parts

5

SYMPOSIA ON PLASTICS

THE DIVISION OF PAINT AND VARNISH CHEMistry of the American Chemical Society, meeting in Boston during the week of September 11, participated in two symposia relating to resins derived from petroleum and x-ray investigations of high polymeric substances, respectively. Abstracts of papers delivered at these sessions are presented below. A report on papers pertaining to plastics which were given at the regular sessions of the division was published on page 46 of the September 1939 issue.

A feature of the business meeting held on September 15 was the decision to request the Council of the Society to change the name of the division to the "Division of Paint, Varnish and Plastics Chemistry." It was also decided to ask the Division of Cellulose Chemistry to join this division in a Symposium on Cellulose Derivatives in Plastics and Lacquers at the 99th meeting of the Society in Cincinnati, Ohio, which will be held during the week of April 8, 1940.

The 1940 officers of the division are: Chairman, E. J. Probeck, Jones-Dabney Co.; Chairman-Elect, G. G. Sward, National Paint, Varnish and Lacquer Association; Chairman of the Plastics Group, Winton Patnode, General Electric Co.; Secretary, A. C. Elm, New Jersey Zinc Co. Members of the Executive Committee: W. W. Bauer, Pittsburgh Plate Glass Co.; W. H. Gardner, Brooklyn Polytechnic Institute; and J. Mattiello, Hy-lo Varnish Company.

Symposium on Plastics and Resins from Hydrocarbons

Propane Precipitation of Petroleum Resins, by P. T. Graff and H. O. Forrest. Petroleum resins may be precipitated out of solutions of liquid propane and viscous fractions of crude petroleum at temperatures of 125 to 180 deg. F.

Production of Petroleum Resins, by S. C. Fulton and A. H. Gleason. Petroleum distillates, particularly those of high aromatic content, may be condensed with formaldehyde to form useful resins. Less highly aromatic stocks may be partially converted to resinous material by chlorination followed by dehydrohalogenation either at elevated temperatures or with metallic halides.

Properties of the Polybutenes and Their Uses in Petroleum Products, by R. M. Thomas, J. C. Zimmer, L. B. Turner, R. Rosen, and Per K. Frolich. Hydrocarbon polymers of high molecular weight and varying in appearance from viscous liquids to tough elastic solids are obtained by the polymerization of butenes at low temperatures.

Catalytic Dehydrogenation of Monoölefins to Diolefins, by A. V. Grosse, J. C. Morrell, and J. M. Mavity. Various butadienes were produced using as catalysts chromium, molybdenum, or vanadium oxide on alumina.

Action of Boron Halides on Hydrocarbons, by R. F. Ruthruff. The preparation and physical properties of the four boron halides were reviewed and the production of resins by the action of boron fluoride on isobutylene, styrene, and diolefins was considered. An electronic interpretation of the action of the boron halides on hydrocarbons was presented.

Dihydronaphthalene Polymers, by N. D. Scott and J. F. Walker. A series of new hydrocarbon polymers has been produced by polymerization of the isomeric dihydronaphthalenes with sodium naphthalene. From 1,4-dihydronaphthalene, light-colored thermoplastic resins are obtained. From 1,2-dihydronaphthalene are produced infusible polymers which, although completely insoluble in most solvents, form colloidal solutions in some halogenated aromatics. By the action of 80 percent sulfuric acid on 1,2-dihydronaphthalene, it is converted to a mixture of dihydronaphthalene dimers.

Influence of Chemical Composition upon the Properties and Uses of Certain Vinyl Resins, by S. D. Douglas. Composition of the reaction mixture and degree of polymerization control the properties of the resin produced by the copolymerization of vinyl chloride and vinyl acetate.

Polystyrene, by A. J. Weith, V. H. Turkington, and Ivey Allen, Jr. Recent work upon the control of the styrene reaction has now made practical the production of styrene resins which are readily soluble in drying oils to produce oleoresinous varnishes. Other properties and uses of styrene were considered.

Study of the Effects of Lubricating Oils on Neoprene Vulcanizates, by D. F. Fraser. The volume increase of a neoprene vulcanizate in a lubricating oil is a logarithmic function of the viscosity-gravity constant and a direct function of the gravity index.

Symposium on X-ray Studies of Substances of High Molecular Weight

The Investigation of Synthetic Linear Polymers by X-rays, by C. S. Fuller. As in the case of low molecular compounds, x-rays can be applied in various ways to the study of high polymeric substances. Three categories may be distinguished: the use of x-rays (1) as an analytical tool, (2) to study the effect of certain variables on the crystalline structure of a given substance, and (3) to determine the molecular crystal structure of the high polymer. This latter field was emphasized in this paper with the object of unifying published work on the synthetic linear polymeric compounds. The classes of compounds considered were as follows: (1) polymethylene oxides, (2) polyethylene oxides, (3) linear polyesters, (4) linear polysulfides, (5) polyethylene and various vinyl derivatives. The role of chain gliding in determining the crystal structures of some compounds was pointed out.

Other papers in this symposium covered the fields of glass, rubber, carbohydrates, cellulose, and proteins.

A Signal Success in Tenite

Usalite flashlight molded by General Electric Co. for U. S. Electric Mfg. Corp.

THIS all-Tenite flashlight casts warning red side rays in addition to a forward white beam—a safety device of particular importance to motorists.

The transparent Tenite lens head is molded in one piece. The Fresnel part is then processed to throw red rays visible for almost a quarter of a mile. The body of the flashlight is attractively designed, and molded in a variety of colors.

The modern design was easily executed in Tenite by the rapid injection molding process. Light weight, durability, lustrous color, and clear transparency are qualities of Tenite which led to the successful production of this flashlight.

Products molded of Tenite achieve a distinction of design that often cannot be duplicated in any other type of material. Literature describing and illustrating the properties and uses of Tenite will be sent on request.

TENITE REPRESENTATIVES. *New York,* 10 East 40th St. *Chicago,* 2264 Builders' Building. *Detroit,* 904-5 Stephenson Building. *Leominster, Mass.,* 39 Main Street . . . Pacific Coast: Wilson & George Meyer & Company—*San Francisco,* Federal Reserve Building; *Los Angeles,* 2461 Hunter St.; *Seattle,* 1020 4th Ave., South.

TENITE **an Eastman Plastic**

TENNESSEE EASTMAN CORPORATION, KINGSPORT, TENN. ***Subsidiary of the Eastman Kodak Company***

LIGNIN PLASTICS CREATED FROM PULP LIQUOR WASTES

by GUY C. HOWARD*

THE MARATHON PAPER MILLS CO. HAS BEEN engaged for many years in pioneering research and commercial developments in the disposal and utilization of waste sulphite liquor which is the liquor containing the lignin and hemi-cellulose constituents of the wood dissolved in the pulping process. The objectives in this have been both to reduce the stream pollution incident to the discharge of this liquor into waterways and to supplement the value of the cellulose pulp by realizing on the commercial potentialities of the large tonnage of non-cellulose organic matter going to waste in such sulphite liquor.

As a result of extensive research and large development expenditures, the so-called Marathon-Howard Processes have been developed. Waste sulphite liquor is now being treated at the Rothschild mill by these processes in full commercial scale plants with a reduction in stream pollution and the manufacture of a variety of products for use by the pulp mill and for outside sale.

Treatment of liquor wastes

The main process by which the liquor is processed into primary products is a three-stage line precipitation treatment. This yields inorganic and organic solid products which can be used by the pulp mill and a process effluent of improved stream pollution characteristics.

The waste liquor as it drains from the blow pits is pumped over an inclined screen to recover any fiber carried through the drainer bottom and then collected in raw liquor storage tanks where the strong and dilute liquors equalize to give a feed of uniform concentration to the process. Sufficient liquor can be collected to carry over 90 percent of the total organic matter dissolved from the wood in the pulping process. The processing of this high percentage of the total organic matter is made possible by the process not involving evaporation and hence both the strong and dilute blow pit drainage can be economically handled.

From the storage tank the hot liquor is pumped at uniform flow to the first reaction tank in which a caustic lime reagent is added in controlled amount to precipitate an inorganic product which is essentially calcium sulphite. This precipitate is settled out and pumped as a slurry to the acid plant for making fresh cooking acid.

The remaining clear liquor flows to the second reaction tank in which a further amount of lime reagent in controlled amount is added to precipitate an organic product. This precipitate is settled out and removed as a wet cake on a rotary vacuum filter. It is essentially a basic calcium salt of lignin sulphonic acid and constitutes the organic product (called "OP") recovered by the process for use as a lignin raw material or as a boiler fuel.

The liquor remaining from this second precipitation and settling passes to a third reaction tank in which it is given a stripping treatment with an excess of lime reagents. This precipitates some additional lignin material which is settled out together with the unconsumed lime reagent and returned as a slurry for use in the process as the lime reagent added in the first reaction tank to precipitate the incoming raw liquor.

The clear liquor remaining after removal of this third precipitate constitutes the main process effluent which can be discharged into waterways with materially less pollution than when discharging the raw untreated liquor. This effluent is hot and alkaline with lime. Its heat content can be utilized to heat wash waters before discharging it to sewer or if desired this effluent can be processed further for the recovery of additional products.[1]

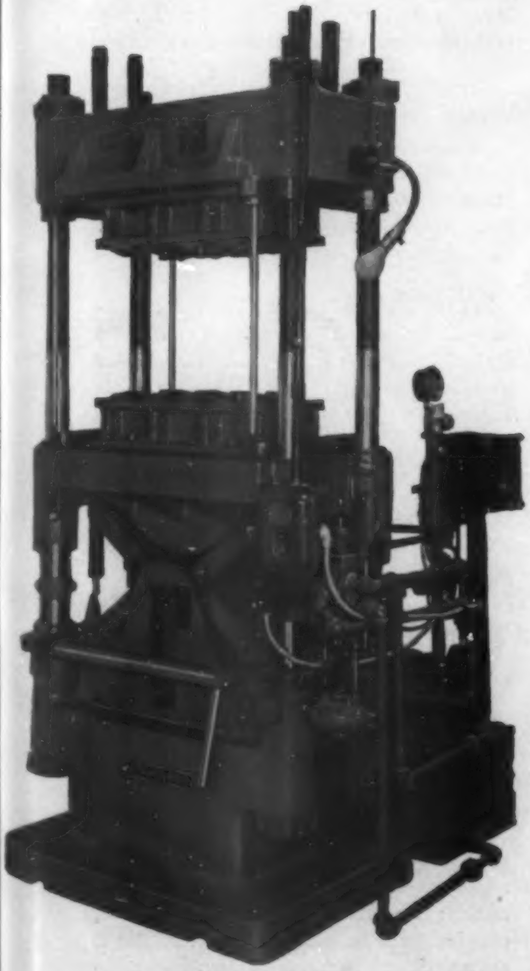
Reduction in stream pollution

Laboratory tests by Marathon and others on the main process effluent in comparison with the untreated liquor show a reduction of around 80 percent in the biological oxygen demand (B.O.D.) thus indicating a very material improvement in favor of this process effluent as regards stream pollution. The actual effect on the Wisconsin River resulting from the processing of sulphite liquor at Rothschild is not known with certainty since it can only be determined by careful comparison of river conditions before and after such processing of the liquor. Surveys of the river at Rothschild are being made by the Wisconsin State Board of Health for comparison of present and past conditions but this data is not yet available.

As a disposal method for reduction of stream pollution only, the processing plant can be simplified and made to cost less than the present installation at Marathon. It is believed this lime precipitation process offers the most economical method available for processing sulphite liquor to lessen its pollution characteristics and for most pulp mill conditions it should be sufficient to avoid stream pollution. If it is necessary in special cases to further purify the effluent it can be done either by yeast fermentation of the raw liquor prior to the lime precipitation or by biological treatment in a trickling filter of the effluent from the lime precipitation or by giving this effluent a short pressure cook to precipitate additional organic matter. (*Please turn to page 130*)

[1] For more detailed description and discussion of main precipitation process see author's paper presented at Superintendents' Association Meeting in Grand Rapids, Michigan, and printed in full in the July 2, 1939, issue of Paper Trade Journal and the August 1, 1939, issue of Paper Mill and Wood Pulp News.

* Marathon Chemical Co.



Plastics Digest

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them. Requests for copies of the magazines mentioned should be directed to the individual publishers whose addresses will be mailed upon receipt of a 3¢ stamp.

General

NEWER PLASTICS MAY SOLVE YOUR PROBLEM. Chemical Industries *45*, 270–5 (Sept. 1939). A review of a great variety of applications of plastics. New uses of rubber and the development, properties, and uses of synthetic lastics are discussed in the August issue of the same journal, pages 140 to 146.

ELECTRODEPOSITION OF SYNTHETIC RESINS. A. Gemant. Ind. and Eng. Chem. *31*, 1233–6 (Oct. 1939). A new process of electrodeposition on metals of synthetic resinous materials is described. The novel feature is the use of hydrophobic insulating liquids, chiefly mineral oils, as the dispersing phase of the necessary suspensions. Because of the absence of electrolytic products as well as traces of water in the deposit, the method seems to be especially suitable for making electrically insulating layers on metals.

PAPER FOR PLASTICS. J. G. Abel. Chem. and Ind. (London) *58*, 796–800 (Aug. 26, 1939). A statement as to the characteristics of papers for use in making laminated plastics in terms of tolerances in such properties as moisture content, absorbency, substance, thickness, mechanical strength, ash, color, and freedom from metallic and other impurities. Discussion Ibid *58*, 53 (Jan. 21, 1939).

PLASTICS. Am. Machinist *83*, 483–94 (June 28, 1939). A special section which includes information on punching, machining, drilling, reaming, threading, sawing, grinding, polishing, and buffing. A table shows various commercial types of plastics, outstanding characteristics, trade names, manufacturers, and principal applications.

GILSONITE. F. R. Jones. Chem. and Ind. (London) *58*, 800–2 (Aug. 26, 1939). Mines in Uinta Basin, Utah, have estimated deposits of gilsonite amounting to 30 million tons. Its physical properties and uses in varnishes, paints, printing inks, floorings, battery boxes, and brake linings are described. Discussion Ibid *58*, 250–1 (Mar. 18, 1939).

Materials and Manufacture

PLIABLE POLYVINYL PRODUCTS. British Plastics *11*, 169–71 (Sept. 1939). Plastics are producible from vinyl chloride resin in a range of hardness from soft and pliable to hard and rigid, and in the forms of sheets, rods, tubes, and sleevings. Tests are reported on resistance to dry heat (100 deg. C. found to be maximum safe working temperature), resistance to petroleum oils and paraffin (becomes stiffer), and resistance to strong acids and alkalies (relatively unaffected except for hardening in 20% NaOH).

SYNTHETIC RUBBER AND ELASTIC POLYMERS. Ind. and Eng. Chem. *31*, 934–68 (Aug. 1939). A symposium presented before the Division of Rubber Chemistry at the Baltimore meeting of the American Chemical Society. Among the subjects discussed in this group of papers are "Nomenclature of Synthetic Rubbers," "Synthetic Elastic Polymers in the Cable Industry," "Neoprene Cements," and "Recent Developments with Koroseal."

Molding and Fabricating

THREADING PLASTIC MATERIALS. G. O. Hall. Am. Machinist *83*, 531–2 (July 12, 1939). A toolbit having considerable back rake at the top and a longitudinal V-groove in the top cuts a smooth thread in laminated plastic and has three times the life between grinds compared with an ordinary grinding tool. A table shows the relation between the angle the toolbit is tilted and the angle of V-groove produced.

DIE-CASTINGS OR PLASTICS? H. Chase. Prod. Eng. *10*, 320–5 (Aug. 1939). A comparison of the advantages and limitations of die-cast and molded plastic parts.

Applications

PERMANENT COLOR IN THE KITCHEN AND BATH. F. P. Hunsicker. Am. Builder and Bldg. Age *61*, 68–9 (Aug. 1939). Relates to the use of plastics for wall coverings.

RECENT DEVELOPMENTS OF RESINS FOR TEXTILE FINISHES. D. H. Powers. Am. Dyestuff Reptr. *28*, 515–9 (Sept. 4, 1939). The treatment of fabrics with cation-active quaternary ammonium compounds increases the amount of water-dispersed resins which they will retain. Production of clear washable luster on fabrics and control of shrinkage and slippage is accomplished with resins. The process of fixing a dry pigment on a fiber with a resin is one of the outstanding recent developments.

LAMINATED PHENOLIC CAMS. G. J. Talbourdet. Prod. Eng. *10*, 369–71 (Sept. 1939). Laminate containing 5 to 7 percent graphite is most suitable for this purpose. Mating gear material should be hardened steel or heat-treated cast iron, and the use of bronze, aluminum, or soft steels should be avoided. The safe wear load on cams can be calculated from the formula $W = \dfrac{KF}{\dfrac{1}{R_1} + \dfrac{1}{R_2}}$, where W is the normal safe wear load on cam surface in lb., K is wear load factor in lb. per in. of face, F is effective width of rolling contact in in., R_1 is the radius of cam roll in in., and R_2 is the radius of curvature of cam track in in.

PLASTIC BEARINGS IN AGRICULTURAL MACHINES. W. Mebolt. Kunststoffe *29*, 221–3 (Aug. 1939). Service experience with plastic bearings in farm equipment is discussed.

PLASTICS IN TYPEWRITER CONSTRUCTION. H. Burmeister. Kunst.-Tech. u. Kunst.-Anwendung *9*, 263–70 (Aug. 1939). The parts molded of plastics include not only the frame but also the central segment, spacer bar, key buttons, and many other essential items.

Testing and Properties

INFLUENCE OF TEMPERATURE ON STRENGTH OF PLASTICS. R. Nitsche and E. Salewski. Kunststoffe *29*, 209–20 (Aug. 1939). This is the first of a series of reports on an investigation of the flexural strength, deflection at rupture, impact strength, compressive strength, tensile strength, elongation at rupture, elastic modulus, and hardness of 26 different plastics over the temperature range −70 to 200 deg. C. In this first report the variation in the flexural strength and deflection at rupture with temperature are shown in tables and curves. The condition of many of the specimens after test is shown in pictures.

ESTIMATION OF THERMAL CONDUCTIVITY AND SPECIFIC HEAT OF PLASTICS. F. Gottwald. Kunststoffe *29*, 248–50 (Sept. 1939). A simple steam calorimeter is described for measuring various thermal properties. Approximately 10 minutes is required for each determination.

TESTS FOR FORMALDEHYDE. R. Duchesnoy. Rev. Gen. Mat. Plastiques *15*, 198–200 (July 1939). Qualitative and quantitative tests for determining formaldehyde are described.

THE SPECTROPHOTOMETER FOR CONTROLLING COLOR. D. K. Donovan. Organic Finishing *1*, No. 1, 4–6 (Oct. 1939). The spectrophotometer separates the component wave lengths of light so that any color can be analyzed and standardized by the examination of the wave-length-intensity curves obtained. The extent of reproduction of any color can be precisely evaluated.

Coatings

CHOOSING A METAL FINISH. A. Bregman. Iron Age *144*, 34–8 (Sept. 7, 1939). Four primary factors to be considered are function, durability, appearance, and cost. Fifteen types of commercial finishes are listed, namely: cementation coats, chemical color, chemical rustproofs, clad metals, electroplates, electrolytic oxides, hot-dip coats, lithographing, organic coats, paints, polishing, porcelain enamels, rubber coats, sprayed metals, and vapor coats.

U. S. Plastics Patents

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 10 cents each

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ADHESIVE CEMENT. D. E. Cordier and E. H. Balz (to Plaskon Co.). U. S. 2,167,874, Aug. 1. Effecting alkaline condensation of 1 mol phenol with 3 mols formaldehyde, precipitating the product, vaporizing the residual water in presence of ethylene glycol, and acidifying with phosphoric acid in ethylene glycol.

WATERPROOF MOLDINGS. C. A. Hochwalt and M. Plunguian (to Mead Corp.). U. S. 2,168,160, Aug. 1. Making a potentially reactive thermosetting molding resin by condensing a phenol with an aldehyde and an alkaline lignin prepared from spent sulphite liquor.

LIGHT POLARIZERS. E. H. Land (to Polaroid Corp.). U. S. 2,168,220–1, Aug. 1. Laminated glass which polarizes light by means of oriented polarizing particles in a cellulose derivative medium with relatively little plasticizer, serving as interlayer while the adhesive layers are composed of a vinyl resin with relatively much plasticizer.

RUBBER PLASTIC. B. S. Garvey (to B. F. Goodrich Co.). U. S. 2,168,279, Aug. 1. Isomerizing rubber with anhydrous hydrofluoric acid in an inert organic solvent to make a thermoplastic.

CAST RESIN. C. M. Fields and G. A. Wilkens (to E. I. du Pont de Nemours and Co.). U. S. 2,168,331, Aug. 8. Imparting integral sheen to a cast resin by dispersing lamellar light reflecting particles in a polymerizable liquid and progressively polymerizing the liquid in rod form by heat in an elongated mold.

VARNISH RESIN. T. S. Hodgins and A. G. Hovey. U. S. 2,168,477, Aug. 8. A water-white thermosetting urea-formaldehyde-ethylene-glycol resin gives waterproof, alcoholproof films when baked.

WATERPROOFING TEXTILES. J. Nuesslein, G. von Finck and H. Stärk (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,168,534–5, Aug. 8. Resins formed from maleic anhydride and an unsaturated long chain dicarboxylic acid (or an ester, amide or nitrile thereof) are used, with or without a condensation product of a tertiary amine with an alpha-halogen ether, for waterproofing textile fabrics.

PLASTICIZERS. R. L. Shuman (to Celluloid Corp.). U. S. 2,168,587, Aug. 8. As plasticizers for cellulose esters, triaryl phosphates in which the aromatic nucleus carries alkyl substituents such as ethyl, butyl and tert.-amyl groups.

VINYL CHLORIDE RESIN. F. K. Schoenfeld (to B. F. Goodrich Co.). U. S. 2,168,808, Aug. 8. Catalytic emulsion polymerization of vinyl chloride in a vessel, in which the gas space is oxygen-free.

VINYL ACETAL RESIN. G. O. Morrison and A. F. Price (to Shawinigan Chemicals, Ltd.). U. S. 2,168,827, Aug. 8. Making colorless vinyl acetal resins by partial hydrolysis and acetalization of a polyvinyl ester other than the formate.

FILM DOPE. E. K. Carver (to Eastman Kodak Co.). U. S. 2,168,972, Aug. 8. Films are made from a dope by heating to expel entrained and dissolved gases, superheating to reduce viscosity, filtering, cooling and casting to form a bubble-free foil.

MOLDING COMPOSITION. Wm. E. Flood and G. B. Howells (to Catalin Corp. of America). U. S. 2,168,981, Aug. 8. Acidifying an alkaline phenol-formaldehyde condensation product, expelling part of the water, mixing with a novolak resin melt and reacting the ingredients to form a spongy resin which may be ground to yield a molding powder.

FILMS. E. F. Izard (to E. I. du Pont de Nemours and Co.). U. S. 2,169,250, Aug. 15. Insolubilizing polyvinyl alcohol by cross linkage with an acid having at least two carboxyl groups, separated by at least two carbon atoms; and making films or foils from the product.

VARNISH RESIN. S. Kohn (to Resinous Products and Chemical Co.). U. S. 2,169,361, Aug. 15. Condensing a phenol with a ketone and condensing this product, in mol ratio 4 : 3, with formaldehyde to make an oil-soluble resin.

OLEFIN RESINS. C. S. Marvel and D. S. Frederick (Frederick assignor to Marvel). U. S. 2,169,363–4, Aug. 15. Making polysulphone resins by reacting olefins with sulphur dioxide and condensing the products with an aliphatic or aromatic aldehyde; and acylating the condensation product.

TREATING FABRICS. D. H. Powers and O. B. Hager (to Röhm and Haas Co.). U. S. 2,169,392, Aug. 15. Coating cellulosic yarn or fabric with water-permeable cellulose or cellulose ether, impregnating with a heat-hardenable urea-formaldehyde resin, and heating to harden the resin.

GASKET. G. T. Balfe (to Detroit Gasket and Mfg. Co.). U. S. 2,169,516, Aug. 15. An insulator gasket which is impermeable to water, gas and oil is made of asbestos and a heat-hardening resin.

BOX TOE. H. R. Dittmar (to E. I. du Pont de Nemours and Co.). U. S. 2,169,558, Aug. 15. A molded box toe stiffener has an absorptive base impregnated with a polymer or interpolymer of acrylic or methacrylic acid or esters or other derivatives thereof.

CONTAINER. P. M. Gilfillan (to Shellmar Products Co.). U. S. 2,169,638, Aug. 15. Making a container from a blank formed of transparent cellulosic sheeting, edges being joined by a thermoplastic adhesive.

MOLD. Heinrich Skolaude. U. S. 2,169,665, Aug. 15. Apparatus for making molded articles in which a pattern extends entirely through the body of the article, with the aid of a plunger profiled with the pattern.

COATING. G. H. Young (to Stoner-Mudge, Inc.). U. S. 2,169,717, Aug. 15. A thermally stabilized vinyl alcohol, chloride or acetate resin for use in coatings.

PRINTED SHAPES. Richard F. Warren. U. S. 2,169,825, Aug. 15. Molding a shaped article from a transparent resin, printing thereon, and again molding the article to draw the resin over the printing.

INLAID PLASTICS. C. Schuster (to Nixon Nitration Works). U. S. 2,169,930, Aug. 15. Forming inlaid patterns in cellulosic plastics with the aid of patterned perforations in a forming tube.

PHENOLIC RESIN. Israel Rosenblum. U. S. 2,169,991, Aug. 15. Condensing one mol of a phenol with at least two mols of formaldehyde in presence of glycerol to form a resin.

CELLULOSE DERIVATIVES. W. Frey and H. Schwalenstöcker (to E. I. du Pont de Nemours and Co.). U. S. 2,170,017, Aug. 22. Insolubilizing soluble cellulose derivatives, for use in films and molded plastics, by treating the soluble derivatives with halides of dibasic organic acids. *(Please turn to next page)*

CELLULOSE ESTERS. W. W. Heckert (to E. I. du Pont de Nemours and Co.). U. S. 2,170,024, Aug. 22. Increasing the elasticity of cellulose ester fabrics or films by esterifying with a dichloride of a dicarboxylic acid.

SWEATPROOF LACQUER. W. J. Clarke (to Bell Telephone Laboratories, Inc.). U. S. 2,170,187, Aug. 22. A perspiration-resisting blended nitrocellulose : alkyd resin lacquer containing finely powdered silica gel.

LAMINATED CLOTH. H. W. Klinger (to E. I. du Pont de Nemours and Co.). U. S. 2,170,416, Aug. 22. Bonding successive layers of fabric together with cellulose acetopropionate, to form a product which withstands the action of alkaline washing solutions.

RESIN-FIBER COMPOSITION. N. D. Hanson (to Bakelite Corp.). U. S. 2,170,755, Aug. 22. A quick-curing resin-fiber composition is made by treating a fibrous web with a blend of two different phenol-aldehyde resins.

PHENOLIC RESIN. E. E. Novotny (to Durite Plastics, Inc.). U. S. 2,170,950, Aug. 29. A permanently fusible resin, containing a reactive phenolic hydroxyl group, is condensed with an ester of anacardic acid.

ELECTRIC INSULATION. R. M. Fuoss (to General Electric Co.). U. S. 2,171,334, Aug. 29. Compounding plasticized polyvinyl halide with lead resinate to form insulation in which heat losses are stable.

METHACRYLATE POLYMER. O. Röhm and E. Trommsdorff (to Röhm and Haas Co.). U. S. 2,171,765, Sept. 5. Mechanically dispersing monomeric methyl methacrylate, with not more than one-tenth its quantity of polymer, in water and polymerizing the monomer to form a granular resin.

UREA RESIN. O. R. Ludwig (to Resinous Products and Chemical Co.). U. S. 2,171,882, Sept. 5. Condensing urea with at least 2 mols of aqueous formaldehyde in butanol in absence of acid, then faintly acidifying with formic acid and completing the condensation.

OIL-SOLUBLE RESIN. Wm. H. Butler (to Bakelite Corp.). U. S. 2,171,914, Sept. 5. Making a heat-reactive oil-soluble resin by condensing a trialkylphenol with formaldehyde; and dissolving the resin in a drying oil to form a varnish.

CARBAMATE RESIN. A. Weihe (to Deutsche Celloid Fabrik). U. S. 2,171,965, Sept. 5. Making oily to resinous products by condensing an alkyl (propyl or higher) carbamate with formaldehyde or acetaldehyde in acid medium.

POLYAMIDE. P. J. Flory (to E. I. du Pont de Nemours and Co.). U. S. 2,172,374, Sept. 12. Thermal polymerization of a polyamide derived from equimolar proportions of a diamine and a dibasic acid.

COMPOUNDED RESIN. Geo. F. C. Houghton. U. S. 2,172,385, Sept. 12. A casting or molding composition, having both thermosetting and thermoplastic properties, is made by compounding a phenol-aldehyde resin with rubber and a vinyl chloride (or acetate) resin.

OLEFIN POLYMERS. M. Otto (to I. G. Farbenindustrie Aktiengesellschaft) and H. G. Schneider (to Standard Oil Development Co.). U. S. 2,172,403, Sept. 12. Making stable viscous to plastic polymers of isobutylene by catalytic low temperature (below −40°C.) polymerization in presence of less than 1% of a sulphur compound.

ELECTROTYPE MATRIX. H. Libberton (to Tenak Products Co.). U. S. 2,172,563 and 2,172,564, Sept. 12. A molded electrotype matrix is made by applying a plastic layer to sheet aluminum and shaping the assembly, including the aluminum sheet, to conform to a master pattern.

ACRYLAMIDE RESINS. D. E. Strain (to E. I. du Pont de Nemours and Co.). U. S. 2,173,005, Sept. 12. Condensing monomeric acrylamide or methacrylamide with an aldehyde to form a resin.

PLASTICIZERS. J. D. Robinson (to National Aniline and Chemical Co.). U. S. 2,173,181, Sept. 19. Plasticizing resins and cellulose esters or ethers with aryl ethers of the mono- or diglycerides of acetic, propionic, butyric, lauric, lactic, benzoic, cresotinic, salicylic, naphthoic or cyclohexanoic acid.

LIGHT POLARIZER. E. H. Land and H. G. Rogers (to Polaroid Corp.). U. S. 2,173,304, Sept. 19. A transparent interlayer for laminated polarizing glass is made from polyvinyl alcohol and is interspersed with dichroic molecules.

PHENOLIC RESIN. V. H. Turkington and Wm. H. Butler (to Bakelite Corp.). U. S. 2,173,346, Sept. 19. Soluble initial condensation products, capable of thermosetting or of reacting with neutral resins or drying oils are made by alkaline condensation of formaldehyde with p-butyl-, p-amyl-, p-hexyl- or p-heptylphenols.

BOTTLE CAP. J. Kronman (to Victor Metal Products Corp.). U. S. 2,173,449, Sept. 19. A molded resin bottle cap is lined with a cork washer and a threaded soft metal lining.

NAIL ENAMEL. Henry C. Fuller. U. S. 2,173,755, Sept. 10. Using a blend of ethylene dichloride and diethylene dioxide as solvent for a cellulose ester nail enamel.

GAS MASK FABRIC. H. Gibello (to Societe Nobel Francaise). U. S. 2,173,781, Sept. 19. Impermeable fabric for gas masks and protective garments (proof against war gases, aerosols and liquids) is made of a pile fabric faced on both sides with an impermeable synthetic resin, and a layer of fabric adhering to one of the synthetic resin faces.

PLASTIC. R. C. Hills and M. M. Barnett. U. S. 2,174,000, Sept. 26. Making a plastic product by condensing formaldehyde with sulphur dissolved in an aqueous solution of alkali metal sulphide.

UREA RESIN. S. L. M. Saunders and L. W. Coveney. U. S. 2,174,012, Sept. 26. Catalytic acid condensation of urea with formaldehyde to form a resin which is soluble in hydrocarbon solvents.

RESIN VARNISH. W. O. Maisch (to the firm of Hermann Frenkel). U. S. 2,174,132, Sept. 26. Resistant varnish coatings on wood contain a blend of phenolic and urea resins.

PELLET MACHINE. Albert W. Sizer. U. S. 2,174,141, Sept. 26. An extrusion machine for forming pellets from a plastic has a perforated die ring traversed by a roller.

PLASTIC. Silvio Pellerano. U. S. 2,174,164, Sept. 26. Blending a coumarone indene resin with chlorinated paraffin and a heavy oil plasticizer to make an adhesive, cold-workable, waterproof dielectric plastic material.

MOLDING THERMOPLASTICS. H. Gastrow (to Franz Braun Aktiengesellschaft). U. S. 2,174,319, Sept. 26. Preheating and agitating granular cellulose acetate or vinyl resin plastics before discharging the material into the cylinder of a molding machine.

LACTIC ACID RESIN. P. D. Watson (to the U. S.). U. S. 2,174,491, Sept. 26. Thermal condensation of lactic acid with furfural in presence of a high boiling petroleum fraction, glycerol and ethanol, to form resins.

VINYL RESIN. C. Bogin (to Commercial Solvents Corp.). U. S. 2,174,495, Sept. 26. A nongelling varnish resin, yielding a tough and strong film, is made by interpolymerizing vinyl chloride with vinyl acetate.


12 TIMES HONORED
in 4 Successive
COMPETITIONS!
2 in 1936
3 in 1937
3 in 1938
4 in 1939
DENTA-KIT, Top Award Novelty Group. Violette, Inc., Chicago, Ill
GUARDLITE, Top Award Transportation Group. Delta Electric Co., Marion, Indiana.
SANIWAY TOOTH BRUSH STERILIZER, Honorable Mention Household Group. Practical Products, Inc., Indianapolis, Ind.
CARDINEER ROTARY FILE, Honorable Mention Industrial Group. Diebold Safe & Lock Co., Canton, Ohio.
In the 1939 Modern Plastics Competition Chicago Molded Products Corporation won the following 4 awards.
Top Prize in the Novelty Group, Denta-Kit Tooth Brush molded of Tenite for Violette, Inc. Chicago, Illinois. Designed by R. J Violette.
Top Prize in the Transportation Group, the Bicycle Guardlite molded of Tenite for Delta Electric Co., Marion, Ind., Designers Barnes and Reinecke.
Honorable Mention in the Household Group, Saniway Tooth Brush Sterilizer molded of Plaskon for Practical Products, Inc., Indianapolis, Ind , Designers Barnes & Reinecke.
Honorable Mention in the Industrial Group, Cardineer Wheel molded of Durez for Diebold Safe & Lock Co., Canton, Ohio, Designers Earl Boughton and Barnes & Reinecke
These successes evidence our superior abilities for molding all types of plastic materials by either the injection or compression methods. Our intimate knowledge of materials and molding technique is available to you.
CHICAGO MOLDED PRODUCTS CORP.
1046 No. Kolmar Ave.
Chicago, Illinois

Foreign Plastics Patents

Application dates are given for patents of European countries, but for Canada the issue date is given

PRINTING MATRIX. Prima-Presse. French Patent 834,825, Aug. 19, 1937. Paper for making matrix sheets is impregnated with a synthetic resin which polymerizes, without the aid of pressure, at a temperature below the softening point of the type form to be prepared.

IMPREGNATED FABRICS. Tootal Broadhurst Lee Co., Ltd. French Patent 830,606, Dec. 9, 1937. Fabrics which have been impregnated with a urea-formaldehyde resin are rendered more durable by a coating of natural or synthetic rubber, applied from an aqueous dispersion.

MOLDING RESINS. H. Rommler Aktiengesellschaft. British Patent 500,479, Aug. 6, 1937. Thermosetting phenolic or aminoplast resins are heated outside the mold and without applying pressure, to the predetermined temperature of maximum plasticity, then hardened in the mold under heat and pressure. Powder, tablets or resin-impregnated fabric shreds may be used for molding.

MOLDING HANDLES. G. V. Calamand. British Patent 501,019, Aug. 18, 1937. Tool, door or umbrella handles, buttons and the like are made by molding a core of sawdust or the like, with or without a binder, around a metal haft, then placing the core in a second mold, with the final molding composition, to complete the article.

DIFFRACTION GRATINGS. F. Twyman (to A. Hilger, Ltd.). British Patent 501,606, Sept. 2, 1937. Diffraction gratings are ruled on a steel die and gratings are molded therefrom, integrally with their mountings, from a polyacrylate ester resin.

HIGH POLYMER MOLDINGS. Aceta G. m. b. H. Swiss Patent 199,476, Jan. 9, 1936. Making shaped articles from highly polymerized imides or anhydrides of polycarboxylic acids, or from interpolymers of dicarboxylic acid anhydrides with olefins or with vinyl ethers.

STABILIZING VINYL RESINS. Kodak-Pathe. French Patent 836,151, March 5, 1938. Polyvinyl acetal resins are stabilized, before or after being polymerized, by reducing the unsaturated impurities electrolytically or catalytically; the products do not deteriorate when exposed to light and air hence they are useful in coatings and in moldings.

ENAMELS. Hermann Plauson. German Patent 673,009, Nov. 10, 1933. Cold-hardening enamels are made with a synthetic resin in the B or C state, colloidally dispersed with acetone or alcohol in a waterglass solution containing ammonia or a heavy metal ammine compound.

SEAMLESS CONTAINERS. International Containers, Ltd. Holland Patent 45,342, May 4, 1937. Seamless high gloss containers are formed from cellulose acetate by a dipping method, using glass or metal forms wet with an aqueous solution of sugar, gelatin and glycerol.

MOLDINGS. N. A. de Bruyne (to Aero Research, Ltd. and De Havilland Aircraft Co.,Ltd.). British Patent 501,649, Aug. 26, 1937. Lengths of flax or linen rove, impregnated with phenol-formaldehyde resin, are molded in lengths in a mold which is kept hot for a specified time, while localized pressure is applied for a shorter time; the final heat-hardening in the mold is effected without pressure. Planks or rings may be made in this way.

FIBROUS MOLDINGS. C. D. Philippe (to Bakelite, Ltd.). British Patent 502,409, Sept. 11, 1937. Making rayon spinning buckets, airplane propeller blades and other articles from slivers of cotton, wool, flax or asbestos impregnated with a heat-hardenable phenolaldehyde resin, which may be blended with a urea-formaldehyde or alkyd resin.

EMBOSSED CONTAINERS. W. W. Groves (to Deutsche Celluloid Fabrik). British Patent 504,030, Oct. 18, 1937. Food or drug containers or the like are formed from vinyl resin sheets or plates, or from a stamped or molded blank made therefrom.

PRINTING PLATES. H. Sonnenfeld and E. Strunk (to Deutscher Verlag). French Patent 835,806, Oct. 3, 1938. Plates for relief or intaglio printing are made from cellulose acetate, polystyrene or a phenol-formaldehyde resin.

UREA RESIN MOLDINGS. Plaskon Co., Inc. German Patent 672,483, March 19, 1931. Hard, tough, nonporous moldings in transparent, translucent or porcelain-like effects are made from urea-formaldehyde resins without the aid of fillers, pigments or plasticizers by condensing an initial condensation product with urea, thiourea or resorcinol and acidifying with an organic acid.

PROTEIN PLASTICS. Studiengesellschaft der Deutschen Lederindustrie G. m. b. H. German Patent 672,931, Feb. 18, 1933. Molding compositions are prepared by action of vegetable tannins on aqueous solutions obtained from hide scrap, and condensation of the tannin reaction product with formaldehyde.

PLASTICIZER. Kodak-Pathe. French Patent 837,636, March 5, 1938. Adding 3–50 per cent of cresyldiphenyl phosphate to vinyl acetal resins to make compositions for light-fast photographic films and for foils, coatings and the like.

INSULATED WIRE. H. R. Dittmar (to E. I. du Pont de Nemours & Co., Inc.). Australian Patent 106,276, July 5, 1938. Coating wire with a hot (200 deg.) melt of 65 parts isobutyl methacrylate polymer and 35 parts coumarone-indene resin, then with regenerated cellulose tape.

PROPELLER BLADES. E. P. King (to De Havilland Aircraft Co., Ltd.). British Patent 504,377, Sept. 15, 1937. Hollow airplane propeller blades are made from preformed complementary molded sections, the joint lines of which extend along the leading and trailing edges; the plastic may be a thermoplastic or a thermosetting resin with fibrous filler.

MICROPOROUS RESINS. U. S. Rubber Products, Inc. British Patent 504,549, Nov. 8, 1938. Microporous sheet materials for filters, storage battery separators, electrolytic cells and the like are made from heat-hardenable phenolic or urea resins by blending with hydrous oxide gels and hardening without permitting evaporation.

gain . . .

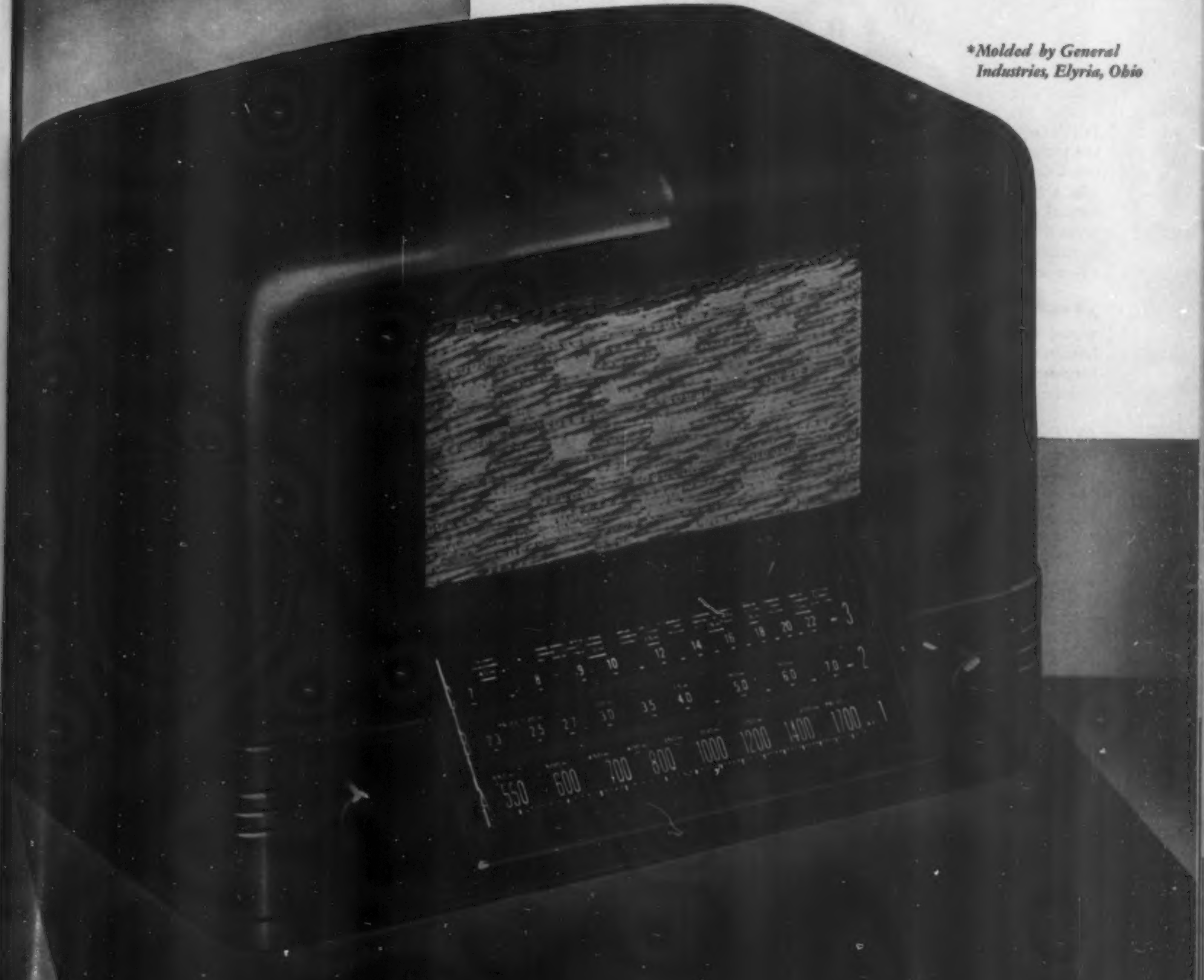
IT'S PLASTICS BY DURITE

For the attractive RCA table type radio cabinet featured.* This giant of portables demonstrates the long flow characteristics of DURITE, its rugged strength, minimum weight, and smooth durable surface finish. ▪ ▪ Radio manufacturers, ever alert in creating new markets, increase the size of DURITE molded portable radio cases with confidence in the splendid service they will render. ▪ ▪ Give your product the benefits of DURITE. Write to Durite Plastics, the exclusive producers of phenol-furfural resins.

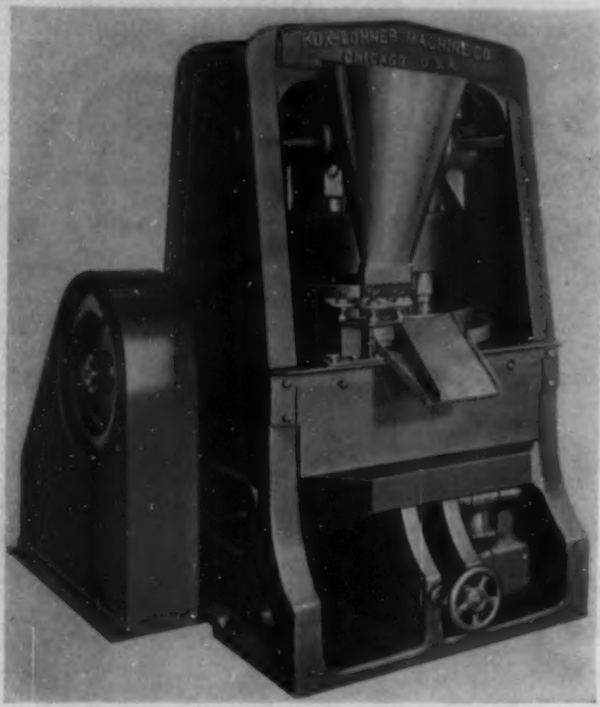
DURITE PLASTICS
REG. U. S. PAT. OFF.

FRANKFORD STATION P. O. PHILADELPHIA, PA.

**Molded by General Industries, Elyria, Ohio*



Equipment



BUILT FOR HIGH SPEED AUTOMATIC PRODUCTION OF LARGE size preforms, the 13,000 lb. Kux-Lohner 6 punch rotary press (illustrated above), when set for maximum size preforms of $3^1/_8$ in. diameter with a 4 in. fill, is said to produce 7200 tablets an hour, consuming approximately 3600 lbs. of plastic material, and to withstand pressures up to 100 tons. A one-piece alloy steel box-shaped frame houses all operating mechanism. Overload release device and a micrometer fill adjustment allow flexibility for producing smaller size tablets.

A LARGE VAN NORMAN UNIVERSAL MILLER, WITH A SPECIAL movement that handles up to 38 in. longitudinally, has recently been installed in the plant of Synthane Corp., fabricator of laminates. Swiveling cutterheads are said to eliminate special angular cutters and permit operators to get practically any angle without special tooling.

AVAILABLE IN 1, 2, 3, 4 AND 8-OZ. CAPACITIES, THE NEW automatic constant level-lubricator, made by Trico Fuse Mfg. Co., maintains correct oil level in a ring-oiled sleeve bearing, ball bearing or in a gear or pump housing. Transparent plastic reservoir shows when refilling is necessary and is easily removable. There are two styles for standard surge and high surge levels, having side outlets or side and bottom outlets for bottom connection or for draining.

A STATIONARY DISINTEGRATOR, WHICH CAN BE ACCURATELY controlled while carrying on the processes of absorption, condensation, fractionation, chemical reactions, heat exchange, gas and air washing, has been developed by the H. A. Brassert Company.

A COMPLETE LINE OF HAND CUT, MILLED CUT, ROTARY files, rasps, and burs, available from Grobet File Corp. of America, are reported advantageous for use with flexible shaft machinery, hand grinders, drill presses, lathes, etc.

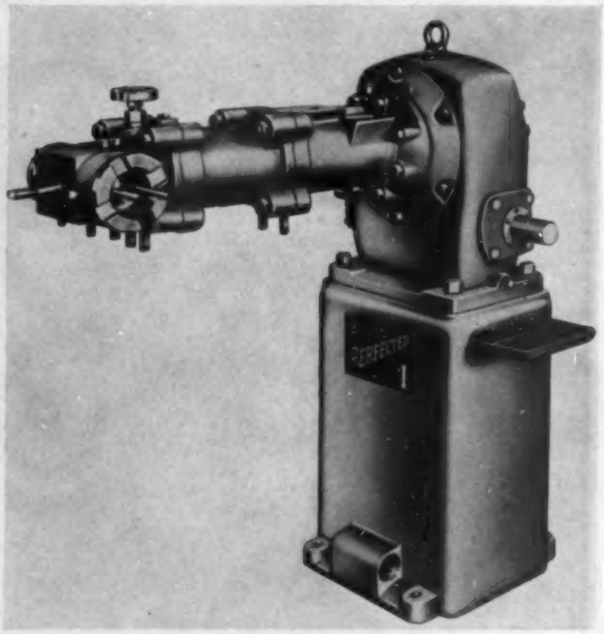
A NEW MOTOR BASE FOR USERS OF BELT DRIVES, WHICH maintains correct belt tension by automatically holding the belt taut through a spring device, has been developed by Ideal Commutator Dresser Co. It is claimed to operate satisfactorily with any type of load, pulsating, steady or reversing.

DOALL PRECISION SAW CARTON, CONTINENTAL MACHINES, Inc.'s new container for a coil of metal band saw, provides a means of handling and dispensing, allows compact storage and prevents rust and damage to delicate saw teeth. A corner opening permits stripping of the required saw length, keeping the remainder intact and visible through a cellophane window.

AN AIR-OPERATED TAPPING MACHINE DEVELOPED BY Procunier Safety Chuck Co. features a unique air-operation unit which is claimed to control production and accuracy, reduce tap breakage, and assure uniform tapping pressures in both drive and reverse directions. Four speeds accommodate the wide range of tap capacities by interchanging two sizes of tapping heads.

A NEW ALL-PURPOSE TOOL POST LATHE GRINDER APPLIcable for many diversified uses is now being manufactured by R. G. Smith Tool & Mfg. Co. It is claimed to be adjustable in every direction, and adaptable for lathes, milling machines, shapers, planers and a wide range of bench work.

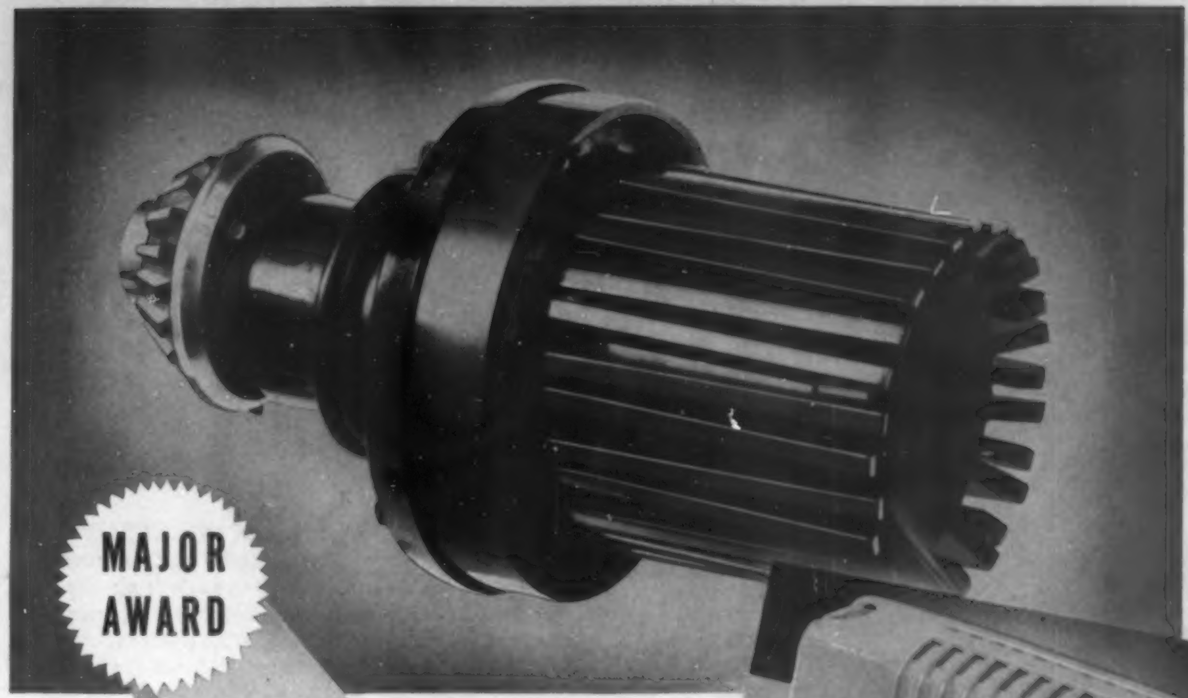
WET-R-DRY GRINDER MADE BY PORTER-CABLE MACHINE Co. is available for either wet or dry grinding, sanding or polishing. It is equipped with a waterized unit which is said to eliminate heat, avoid distortion, reduce quantity of abrasive grains and eliminate dust and explosion hazards.



JOHN ROYLE & SONS, INC., HAVE DEVELOPED A NEW PLAStics extruding machine to provide continuous extrusion of resin compounds by the use of feed screws and die heads substantially the same as those long used for rubber. The screw type extruder, it is said, can be used to make rods, tubes and channels; to insulate wire; to cover hose and rollers and to remove foreign particles from stocks by straining; and the new resin die head is reported satisfactory for producing resin-covered wire. (This machine is illustrated above.)

CALLED "FLASHEAT," A NEW ELECTRIC HEATING ELEMENT, recently developed for use as standard equipment on its electrically heated kettles, and for heating various types of vessels, chemical apparatus, has been announced by Patterson Foundry & Machine Co. It is claimed to heat more rapidly, allow more heat concentration per unit area, permit rapid water cooling, to be easily replaced, and need not be preformed to fit shape of kettle or other body to be heated.

A NEW, SMALL MODEL VIBRATORY DRY FEEDER MACHINE has just been added to its line of larger capacity machines by the Syntron Co. A 1 cu. ft. hopper supplies material to a conveyor trough. The



GENERAL INDUSTRIES

shares honors twice in Modern Plastics competition

● A Major Award in the Industrial Group to the Rayon Machinery Corporation for the Thread-Advancing Reel is a signal honor which reflects credit on all who participated in its production. This plastic reel was produced for continuous spinning machines at the Painesville, Ohio, plant of Industrial Rayon Corporation. General Industries is proud to have been a source of supply, having been selected because of superior engineering ability, long experience in molding plastic parts, and the equipment capable of handling the most difficult and complex operations.

Stewart-Warner Corporation's "Air-Pal" radio (designed by Barnes & Reinecke) in the Decorative Group, was deservedly accorded Honorable Mention. General Industries, as the producer of this beautiful cabinet, is happy to participate in the honor.

Manufacturers in every line can confidently look to General Industries as a dependable source of supply of molded plastic parts. The most exacting requirements for accuracy and finish will be fully met under all conditions.

GENERAL INDUSTRIES CO.

MOLDED PLASTICS DIVISION

OLIVE AND TAYLOR STREETS • ELYRIA, OHIO

rate of flow of material through this feeder trough is regulated by the amplitude of the trough's electro-magnet vibrator which is controlled by means of a rheostat mounted in a separate wall panel controller supplied with each machine. The hopper is kept free flowing by a small electro-magnet vibrator attached to one of its sides that prevents arching over and clogging up of material, it is claimed.

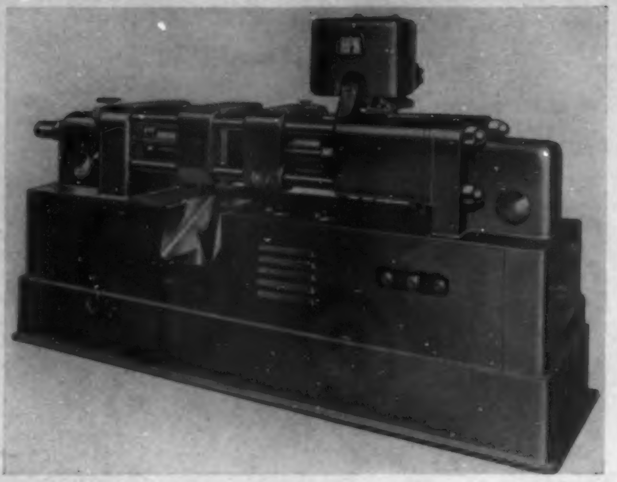
ONE OF THE MOST IMPORTANT PHYSICAL PROPERTIES OF either thermo-plastic or thermo-setting molding compounds is the rate of flow under heat and pressure. This property is usually evaluated by means of a Peakes-Rossi flow tester. Each test requires several $^3/_8$ in. diameter preforms, $^3/_8$ in. in thickness. Nearly all standard pelleting machines are made to produce pieces comparatively thin in proportion to diameter. A machine for making $^3/_8$ in. thick pellets would be rather large and expensive, while a machine for making $^3/_8$ in. diameter pellets would make the thickness only about $^3/_{16}$ in. Placing two of the tablets on the highly heated plunger of the testing machine is very inconvenient.

The machine in the illustration above is made by F. J. Stokes Machine Co. It is small, convenient to operate and inexpensive, compared to any machine previously available for making Peakes-Rossi Pellets. The fill is made by hand, permitting the handling of materials which do not readily feed in an automatic feeder. The rate of production is about 8 to 10 pellets per minute which is ample considering that only a few pellets are required for each flow test. Depth of fill is easily adjustable up to 1 in. and the pressure is also readily adjustable and the machine is capable of exerting a maximum of about 3000 lbs. on each pellet, or about 27,000 lbs. per sq. inch on the $^3/_8$ in. diameter pellet. The machine is 24 in. high and weighs about 75 pounds.

STANDARD TYPE FRICTION CLUTCHES WITH METAL TO metal frictions and Super-Johnson type clutches with Raybestos faced expansion ring are listed in a 1939 illustrated catalog issued by the Carlyle Johnson Machine Company.

COMPLETE INDUSTRIAL SERVICE MACHINERY, MACHINE tools, electric motors, electric trucks, etc., are fully described with all specifications in a folder by Industrial Machinery Co., Incorporated.

A VARIETY OF TIMING AND MEASURING DEVICES, INCLUDING seconds-stop clocks, long distance telephone and teletype time checkers, dial and vernier calipers are manufactured by Glogau & Co.



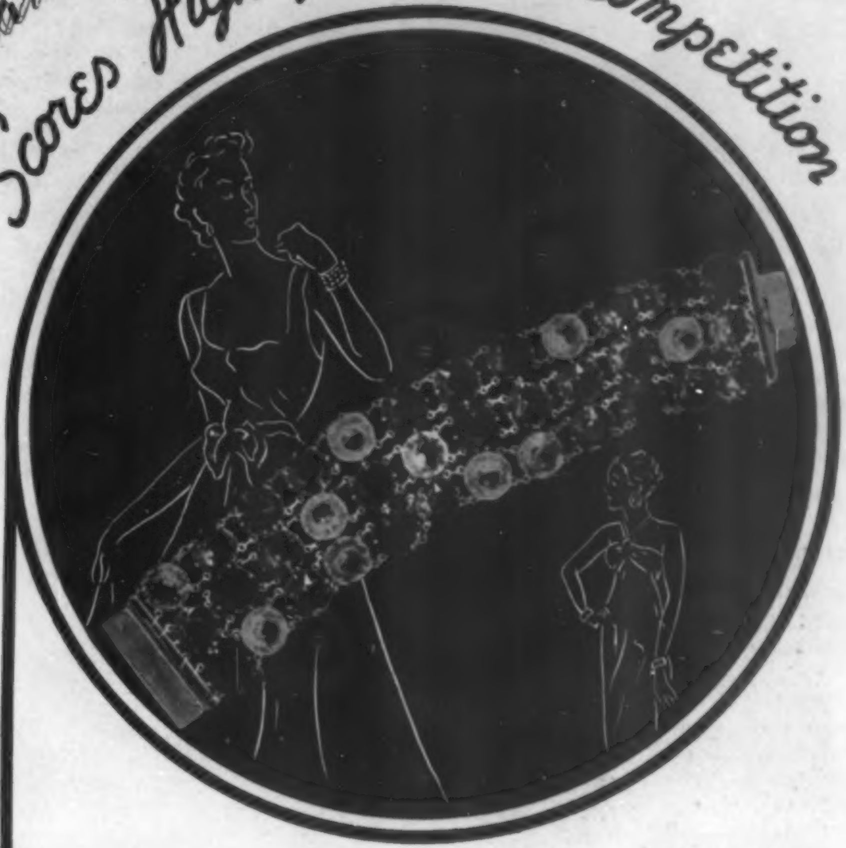
A RECENT DEVELOPMENT IN ITS LINE OF INJECTION PRESSES is Hydraulic Press Manufacturing Co.'s model 40-H-2, a complete self-contained machine of the horizontal clamp type. It is actually two separate units consolidated into one press: namely, the injection unit and the clamp unit, each having its own operating valves and controls. Both manual and automatic controls are provided, and it may be installed by simply making connections for electricity and cooling water. The new press is pictured above.

A BULLETIN COVERING A NEW LINE OF FACE-SHIELDS, which are now being widely used to protect workers from dust, sparks, heat and glare, has been published by the Davis Emergency Equipment Co. All types are provided with replaceable transparent Plastacele windows which resist heat, acids and caustics and are furnished in clear, green or amber colors.

JAR MILLS USED FOR PULVERIZING OR MIXING EITHER solids or liquids, are available from U. S. Stoneware Co., supplier of tanks, jars, pots, trays and storage and mixing equipment for acids and corrosive chemicals. Descriptive bulletins are obtainable upon request.

THE MOTO-TOOL NICK-NACK ELECTRIC CARVING KIT, A novel innovation in handicraft, recently introduced by Dremel Manufacturing Co., contains all basic instruments for carving plastics, a supply of Bakelite cast pieces in various shapes and colors and an illustrated manual of instruction for making 41 useful items. Two different outfits are offered, the larger containing a more elaborate assortment of attachments and plastic materials and a heavier, faster, more powerful motor-in-hand electric grinder, which can be used for carving in wood as well as plastics.

Transplastic Scores High Honors in Competition



THE Bracelet shown above was produced by the new, exclusive Waterbury TRANSPLASTIC molding process. It was accorded high honors in recent Modern Plastics competition. . . . To any but the expert eye it represents a handsome setting of genuine rubies, exquisitely cut from true, deep color stones.

TRANSPLASTIC now makes possible the duplication in plastics of beautiful costume jewelry—retaining all of the brilliance of real gems through highly polished facets and authentic colors.

For jewelry of all types—in any size, shape or colors . . . for volume sales and instant eye appeal . . . investigate TRANSPLASTIC now.

Plastic Division

THE WATERBURY BUTTON COMPANY

MAIN STREET EST. 1812 WATERBURY, CONN.

New York City Boston Philadelphia Rochester Detroit Chicago Toronto Cleveland

Publications

Write for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery. Other books will be sent postpaid at the publishers' advertised prices.

Handbook of Chemistry and Physics—23rd Edition

Charles D. Hodgman, Editor-in-Chief

Chemical Rubber Publishing Co., Cleveland, Ohio, 1939
Price: Regular ed. $3.50; Deluxe ed. $6.00 — 2239 pages

The publishers of this outstanding handbook continue in their policy of frequent revision and expansion of its contents in order to make readily available the new data which annually appear in the many scores of scientific journals throughout the world. This year's book has a larger page size which we think greatly improves its appearance and utility. In addition to extensive changes in the well-known mathematical, physical and chemical tables, several additional features have been introduced. Among these is an index of organic compounds according to melting and boiling points which should be very helpful to an investigator in the field of qualitative organic analysis. G. M. K.

Science Today and Tomorrow

by Waldemar Kaempffert

Published by the Viking Press, Inc., 18 E. 48 St., New York, 1939
Price $2.50 — 275 pages

As Science Editor of the *New York Times*, Waldemar Kaempffert is internationally known for his fair and interesting treatment of scientific progress throughout the world. An experienced journalist, he is able to present the miracles of our times in simple language that all may understand and enjoy. In his new book he describes the sun and its influences upon our daily lives in a way that makes it very real and exciting. He deals with the "Birth and Death of the Moon" in such vivid details and terms that we steel ourselves for the approaching impact when "Moon Crashes into Earth at Last."

Through eighteen thrilling chapters he reveals the progress of science and indicates the shape of things to come but his one chapter on "The Chemical Revolution" is worth the price of the volume to the readers of this magazine. Of the Revolution, he says: "The stuff of which the universe is composed is being torn apart, molecule by molecule, atom by atom; and out of the atomic fragments new kinds of matter are being created and the release of a new kind of energy is promised."

He points out how synthesis has aided industry; its affect on engineering materials; its promise of protection as coatings from this "Age of Rust." But more important, it seems to me, he inspires our sluggish imaginations to look beyond the present point reached by plastics and other synthetics, into a future where their greatest development and expansion lie, almost untouched and unexplored. E.F.L.

Standard Chemical and Technical Dictionary

by H. Bennett

Chemical Publishing Co., Inc., 148 Lafayette St., New York, 1939
Price $10.00 — 680 pages

Here is a book which combines in a single alphabetically arranged list definitions of technical terms from all branches of science, data on the properties of organic and inorganic chemicals, and information on the nature of various trade-marked products. In addition it sets forth the meaning of many abbreviations, contractions, and Greek, mathematical, and apothecary symbols, contains a guide to the pronunciation of chemical words, and presents the system of nomenclature used internationally for organic compounds. All of this information is arranged so as to be easily accessible. The format and typography merit especially favorable comment. It is a book which is certain to demonstrate its usefulness constantly in any technical office. G. M. K.

DESIGN STUDENTS AND OTHERS INTERESTED IN A BRIEF graphic record of architecture and design at the New York World's Fair will find it in *A Design Students' Guide* published by *P M* magazine and Laboratory School of Industrial Design, 116 East 16 St., New York, N. Y. ($.50). Originally published as a guide to those visiting the Fair, this beautifully printed and illustrated booklet provides a lasting record of those buildings, displays, exhibits and other individual expressions of the architect and designer which in the opinion of the editors make worthy contributions to modern art. The names of architects and designers, together with comment about materials used, are identified with each illustration of their work.

NINTH EDITION OF THEIR GENERAL CATALOG OF SYNthetic, organic chemical products has recently been issued by Niacet Chemicals Corp., Niagara Falls, N. Y.

AN ATTRACTIVELY ILLUSTRATED BOOK ON *FINE CHEMICALS* —the term for 63 organic chemicals recently added to those already industrially available—has just been published by Carbide and Carbon Chemicals Corp., 30 East 42 St., New York. Through its publication, the chemical industry is offered a well-balanced array of commercial synthetic organic chemicals—including now a wide choice of chemicals in each major organic family. In addition, a glimpse of the future is given by listing many "research" products, samples of which can be supplied on request.

Complete tables of physical properties are included in the new book, enabling the chemist to tell rapidly the boiling points, water solubilities, flash points, and other necessary characteristics of these chemicals. The newly available properties obtainable in the new products, in terms of evaporation rates, water solubilities, oil solubilities, and boiling points, are very desirable in certain processes. This book gathers together for the first time descriptions of these 63 chemicals and condenses into a handy reference source many facts hitherto unpublished.

A BRIEF OUTLINE OF THE HISTORY OF INDIRECT AIR HEATing and information on the design and construction of Despatch indirect air heaters is included in bulletin No. 74, recently issued by Despatch Oven Co., Minneapolis, Minn.

A CATALOG PRICE LIST COVERING PUSH AND KICK PLATES to be used on doors in stores, restaurants, hotels, hospitals, etc., has been issued by the Formica Insulation Co., Cincinnati, Ohio.

BULLETIN 701 PUBLISHED BY PRECISION SCIENTIFIC CO., 1736 N. Springfield Avenue, Chicago, gives complete specifications on a new Saybolt Viscosimeter with automatic constant temperature control accurate to plus or minus .03 deg. F. for finding oil viscosities according to Method D 88 of the American Society for Testing Materials. The new Viscosimeter, available in 2-unit and 4-unit models, represents two years of research, offers novel design, with 30 important features to promote accuracy of determinations and ease in handling.

A RECENT BOOKLET FROM THE DICALITE CO., 120 WALL ST., New York, N.Y., covers problems of filteration (suspended particle removal) various grades of filteraids available and their comparative values, where used and gives instruction on how best to use them. Included also is a short discussion of costs with the use of pressure filters and diatomaceous silica filteraids.

REVISED, ILLUSTRATED BULLETINS HAVE BEEN ISSUED BY American District Steam Co., North Tonawanda, N. Y., describing a piston-ring expansion joint, which can be completely unpacked and repacked under full operating pressure without shutting off steam or interrupting service, Adsco-Fiberglas insulation for thermal insulation of underground lines, a tile conduit for underground steam or hot water lines and a cast iron conduit for steam lines under roadways.

MOTOR DRIVEN CUTTING MACHINES FOR CUTTING GLASS, plastics, tiles, etc., are illustrated and described in a recent folder from Pistorius Machines Sales Co., 258 Broadway, New York, N. Y.

COMPLETE ILLUSTRATIONS AND LISTINGS OF ALL TYPES OF drills, reamers, screw extractors, counterbores, interchangeable punches, etc., manufactured by Whitman & Barnes, Detroit, are included in a new spiral-bound general catalog.

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NEWS

RAIN GREETED MEMBERS OF THE SOCIETY OF THE PLASTICS Industry when they gathered for their Fall meeting at the Westchester Country Club on Sunday, October First. In fact, rain reigned supreme during all three days the gathering was in session. Nevertheless, more than 125 members and guests appeared to enjoy the situation with bridge and poker taking (beside other things) their minds off the weather.

Joe Kirkwood, who seemed to have a pull with the weather man, demonstrated his famous trick shots on Monday afternoon to the amazement and enjoyment of an attentive audience. As soon as he had finished, however, it began to rain again. Competition golf was out of the question, so the prizes were distributed by drawing numbers out of a hat. This gave a number of members a chance to compete more favorably than ever before.

The business session on Monday morning was well attended and various matters of interest were discussed. The vote to change the by-laws was counted after all present, who hadn't voted in advance by mail, had cast their votes. The new by-laws, it is felt by the directors, will permit them to intelligently plan and carry out a suitable program of organization activity once a budget has been established and approved. There was much discussion about the possible budget and it was pointed out that all company members (of which there are only 39 at the present time) will have ample opportunity to reject or approve any budget figures before they can be definitely established.

Membership, as established by the changed by-laws, consists of company memberships which hold the power of vote and whose dues shall be regulated by their desires for organization activity. Social membership, dues for which are established at $5.00, includes all individuals employed by company members who wish to participate in the social activities of the organization.

It was decided to hold the Annual Spring meeting at a point more convenient to those members in the Middle West and a committee comprised of Charles Franz (Kurz-Kasch, Inc.), chairman, L. H. Amerine (Imperial Molded Products Corp.), J. L. Howie, Jr. (Grigoleit Corp.) and Paul Teitz (Richardson Co.) was appointed to report on a location and arrange details of the meeting and entertainment.

The banquet, freed (we hope permanently) from any interruptions of business, sailed smoothly along under the direction of the entertainment committee of which George Scribner (Boonton Molding Co.) was chairman. After dinner attractions, staged by Walter Rosemont Productions, were handled by Jim Reynolds, master of ceremonies and tall stories. He introduced Paxton, the Memory Marvel, whose clever memorization tests made all of us forget about everything else. The balance of the evening was devoted to the tricks and antics of Maurice, the (lucky public) waiter whose magic was much admired.

Among those present were: Dr. H. R. Moulton, American Optical Co.; C. S. Lawrence, American Plastics Corp.; J. L. Deegan, H. E. Stover, J. K. Vaughan, Anchor Cap & Closure Corp.; J. D. Brought,

3

Members of the S. P. I. (3–4), attending the Fall meeting at the Westchester Country Club, watch with great interest the skillful trick golf shots demonstrated by Joe Kirkwood (1–2)

4

Armstrong Cork Co.; A. Blackinton, A. O. Burgess, R. E. Burgess; C. W. Douglas, B. Stenberg, Associated Attleboro Mfrs., Inc.; G. P. Anderson, W. E. High, D. Woodruff, Auburn Button Works, Inc., A. Brown, G. Brown, S. Brown, C. Blount, D. M. Buchanan, W. T. Cooper, J. E. Horn, L. Hobson, D. S. Kusanbou, D. A. Munns, E. W. Vaill, Bakelite Corp.; W. N. Finney, F. J. Groten, C. Romieux, F. H. Sorenson, W. F. Torres, M. V. Wright, Beetle Products Div., American Cyanamid Co.; F. Davidson, C. J. Groos, R. W. Post, G. K. Scribner, Boonton Molding Co.; A. Desimone, Bright Star Battery Co.; J. L. Hutching, Brosites Machine Co.; R. H. Cunningham, T. Ryan, C. J. Smith, Bryant Elec. Co. (Hemco Plastics Div.); E. M. Robb, T. F. Butterfield, Inc.; B. F. Hendon, Canadian Industries, Ltd.; H. S. Bunn, G. C. Miller, Carbide and Carbon Chemicals Corp.; H. Krehbiel, W. Thiele, Catalin Corp.; W. J. A. Connor, W. T. Cruse, H. Harding, Celluloid Corp.; M. C. Bachner, Chicago Molded Products Corp.; C. J. Haag, Columbia Protektosite Co., Inc.; T. L. Allen, R. H. Allen, E. W. Birney, J. W. Coffman, L. W. Freeman, Consolidated Molded Products Corp.; G. A. De Mattia, De Mattia Machine & Tool Co.; D. Dew, W. Ross, N. L. Stafford, Diemolding Corp.; R. W. Brokaw, L. B. Gillie, F. Hoyt, C. Hunton, E. R. Johnston, W. A. Joslyn, H. W. Paine, W. Rahm, R. M. Slipp, E. I. du Pont de Nemours & Co., Inc.; E. F. Borro, A. W. Hanmer, Jr., C. H. Kitchen, L. J. Pentland, H. S. Spencer, Durez Plastics & Chemicals, Inc.; F. A. Morlock, Durite Plastics, Inc.; C. D. Gardner; T. E. Giblin, W. H. Milton, Jr., General Electric Co.; A. W. Fritzsche, General Industries, Inc.; R. B. Connolly, F. R. Estabrook, S. W. H. Jones, G. B. Perkins, Jr., Gorham Co. (Plastics Div.); V. A. Gwyer, Hartford-Empire Co.; J. J. B. Fulenwider, T. Marvin, Hercules Powder Co., Inc.; E. Steinberger, Insulation Mfg. Co., Inc.; H. J. Kasch, H. J. Kasch, Jr., Kurz-Kasch, Inc.; J. G. Swanson, Leviton Mfg. Co.; S. I. Howell, D. Kendall, K. Macksey, J. McIntosh, Mack Molding Co.; M. M. Makeever, R. L. McLaughlin, C. R. Olson, Makalot Corp.; Dr. H. Hoffman, John W. Masury & Son; C. A. Breskin, P. Backstrom, A. Cole, R. Davidson, Dr. G. M. Kline, E. F. Lougee, M. A. Olsen, Modern Plastics magazine; F. A. Abbiati, G. C. Gress, C. L. Jones, Jr., A. C. Martinelli, C. F. Reeves, Monsanto Chemical Co.; R. Kinnear, A. R. Van Horne, Niagara Insul-Bake Specialty Co., Inc.; M. W. Peters, W. B. Savage, E. W. Tucker, Nixon Nitration Works; F. C. Meacham, V. Sammet, B. E. Schlesinger, H. Wanders, Northern Industrial Chemical Co.; S. Pellerano; A. Egerter, J. L. Rodgers, H. Spitzer, Plaskon Co., Inc.; G. J. Crossman, G. Stevens, Plastics, Inc.; W. B. Greenlaw, J. J. Larmour, C. B. Newcomb, Plastic Inlays, Inc.; E. Hemming, Plastic Products, Inc.; J. W. Anderson, Plastic Molding Corp.; Dr. F. Pollak; W. G. Hirschfield, H. L. Persyer, L. G. Wood, Reilly Tar & Chemical Corp.; C. Lichtenberg, Resinox Corp. (Div. of Monsanto Chemical Co.); R. St. Laurent, Rogers Paper Mfg. Co.; K. N. Atwater, D. Plume, Röhm & Haas Co.; H. W. Hahn, F. H. Shaw, D. O. Smith, Shaw Insulator Co.; G. H. Sicard; R. E. Berg, Tech.-Art Plastics Co.; E. C. Cathcart, R. Grant, S. Palmer, W. Searles, J. Tokarz, R. C. Tuttle, Tennessee Eastman Corp.; H. Myers, E. A. Terkelsen, Terkelsen Machine Co.; J. D. Thompson; R. A. Loeb, C. E. Slaughter, H. D. Savage, Universal Plastics Corp.; L. Baron, S. Sopery, Victor Metal Products Corp.; Wallace F. Riebold, Waterbury Button Corp.; J. R. Neill, Watertown Mfg. Co.; J. P. Case, S. S. White Dental Manufacturing Company, Industrial Division.

THE AUTUMN MEETING OF THE WESTERN DIVISON OF the S.P.I. took place Sunday, Monday and Tuesday, September 11–13, at the Spink Wawasee Hotel, Lake Wawasee, Indiana. The registered attendance reached 57.

A golf tournament took place Monday and several prizes were distributed. Monday evening a banquet was held, presided over by Chairman Allen Fritzsche. Clint Blount of Bakelite reviewed the progress being made by George Sicard and the future plans under way for the further assistance and help to be rendered to the plastic field by the Stevenson, Jordan & Harrison organization.

Many of the proposals made at the meeting were discussed and voted on during the Eastern Meeting held on Oct. 1–3, at Rye, New York. Among those present at the Western Meeting were: H. T. Coghill, American Cyanamid Co. (Beetle Products Div.); J. W. Lougheed, American Insulator Corp.; C. W. Blount, R. E. Brannan, W. Hoey, W. B. Longacre, H. J. McGowan, Jr., D. O. Van Ness, Bakelite Corp.; J. J. Bachner, J. E. Johnston, W. L. Kelly, Chicago Molded Prod. Corp.; R. E. Coleman, W. D. Hodson, Roy E. Coleman, Inc.; H. R. Marshall, J. W. Palen, Cutler-Hammer, Inc.; W. Goggin, J. W. Harris, Dow Chemical Co.; R. E. Blanchard, E. I. du Pont de Nemours and Co., Inc.; A. W. Hanmer, Jr., J. S. Miller, F. C. Rowley, R. J. Schmidt, H. S. Spencer, G. W. Wilcox, Durez Plastics & Chemicals, Inc.; C. H. Whitlock, Firestone Tire & Rubber Co.; W. H. Bach, J. H. Du Bois, J. C. Miles, A. Treece, General Electric Co.; C. H. Allin, A. Fritzsche, L. M. Payne, General Industries Co.; R. Campbell, Grigoleit Co.; L. G. Amrine, R. S. Amrine, C. Williams, Imperial Molded Products Corp.; H. Erickson, Industrial Molded Products Corp.; J. H. Bauman, C. H. Frantz, H. J. Kasch, Jr., Kurz-Kasch, Inc.; M. M. Makeever, C. R. Olson, Makalot Corp.; R. H. Dawson, J. R. Harris, E. E. Mills, Elmer E. Mills Corp.; J. M. Connors, Modern Plastics magazine; G. C. Gress, G. Holmgren, J. Turnbull, Monsanto Chemical Co.; T. Friberg, National Lock Co.; H. W. de Vore, R. B. Harrison, W. W. Shephard, T. Walker, Plaskon Co; F. W. Dunnican, Reilly Tar & Chemical Co.; P. C. Teitz, Richardson Co.; S. E. Palmer, Tennessee Eastman Corporation.

EDUCATIONAL AS WELL AS ENTERTAINING, *MODERN Plastics Preferred*, a twenty-five minute sound and color film, reveals the source of plastic materials, follows them through various stages of fabrication into commercial products and pictures some unusual and effective applications of these plastics. The film is available without cost from the Publicity Department, MODERN PLASTICS, 122 E. 42nd St., New York, N. Y. Write for open dates and booking information.

We urge you to take advantage of local showings in your city. The tentative schedule of bookings for November and December follows:

Nov. 1, Oberlin High School, Oberlin, Ohio; Nov. 3, Sacramento Home Workshop Club, Sacramento, Cal.; Nov. 6, Industrial Group, Y. M. C. A., Kellogg, Idaho; Nov. 8, International Business Machine Corp., Engineering Laboratory, Endicott, N. Y.; Nov. 9, Business Men's Forum, Y. M. C. A. of St. Louis, St. Louis, Mo.; Nov. 13, Exchange Club of Gardner, Gardner, Mass.; Nov. 13, Wekearney Club, Kearny, N. J.; Nov. 16, Toledo Section, American Chemists' Society, Toledo, Ohio; Nov. 20, 21, Shreveport Chamber of Commerce, Shreveport, La.; Nov. 20, Visual Education Dept., Babson Institute, Babson Park, Mass.; Nov. 23, Freeport Sulphur Co., Port Sulphur, La.; Nov. 24, 28, Visual Film Library, Ithaca Public Schools, Ithaca, N. Y.; Nov. 27, Queens County Foremen's Club, B. Schwanda & Sons, Long Island City, N. Y.; Dec. 1, A. M. Foremen's Club, Cleveland, Ohio; Dec. 4, Evansville Chamber of Commerce, Evansville, Ind.; Dec. 4, Amer. Institute of Chemical Engineers, University Station, Gainesville, Fla.; Dec. 8, Seattle Chamber of Commerce, Seattle, Wash.; Dec. 11, 14, Charleston Chamber of Commerce, Charleston, W. Va.; Dec. 14, Industrial Foremen's Club, Y. M. C. A., Waterbury, Conn.; Dec. 18, Wheeling Chamber of Commerce, Wheeling, W. Va.; Dec. 18, Boardman Trade School, 95 Broadway, New Haven, Conn.; Dec. 21, John Hay High School, Cleveland, Ohio; Dec. 22, A. S. M. E., Student Branch, Purdue Univ., West Lafayette. Ind.

DEDICATED TO THE PEACEFUL PURPOSE OF "BROADENING the usefulness of the mechanical engineering profession," the 60th Annual Meeting of the American Society of Mechanical Engineers will be held in Philadelphia at the Bellevue-Stratford Hotel, Dec. 4–8. The technical program includes a Rubber and Plastics session at which the following papers are scheduled to be presented:

Physical Permanence of Plastics, by J. Delmonte, Chicago Flexible Shaft Co.; *Neoprene as a Spring Material*, by F. Yerzley, E. I. du Pont de Nemours & Co.; *The Importance of the Service Temperature Flow Characteristics of Thermoplastics*, by W. F. Bartoe, Röhm & Haas Company.

THE RESEARCH LABORATORIES OF REICHHOLD CHEMICALS, Inc., Detroit, announce the addition of another new development to their long list of discoveries in the synthetic resin field—the perfection of an *air drying* urea-formaldehyde synthetic resin. Urea resins have long been used as one of the important components of certain types of plastic molding resins and, more recently, in the surface coating industry for enamels requiring high temperature baking for curing. Now, through this recent discovery the greatly increased hardness which urea-formaldehyde resins impart to surface coating materials is available for air drying finishes, as well as baking and molding materials.

NEWS

AN OUTLINE OF A PROPOSED BOOKLET ON PLASTICS WAS discussed by representatives of the Plastics and Rubber Division of the American Society of Mechanical Engineers at the Westchester Country Club on October 3 following the SPI meeting. The publication which is intended primarily for engineers and students in engineering schools will be divided into four parts, namely: Materials, Molding and Finishing, Applications, and Properties and Testing. Another division of the booklet will similarly consider the subject of rubber. Dr. Felix Yerzley, chairman of the Plastics and Rubber Division, and Messrs. S. C. Stillwagon, H. S. Spencer, Spencer Palmer, E. F. Lougee, and G. M. Kline were among the members and visitors who participated in the discussion at the Westchester.

J. H. CLARK, GENERAL SALES MANAGER OF MONSANTO Chemical Co.'s Plastics Div., with headquarters at Springfield, Mass., announced today that Charles Lichtenberg, who has been vice president and sales manager of Resinox Corp., subsidiary of Monsanto, will become sales manager of all plastics molding materials produced by the company. Resinox became a subsidiary of Monsanto in May, 1939, and Mr. Lichtenberg will continue to direct the sales of Resinox molding materials in addition to the sales of Monsanto cellulose acetate and polystyrene molding compounds. Mr. Lichtenberg's office will be transferred from the Monsanto New York general branch office at 30 Rockefeller Plaza, to Springfield.

Mr. Clark also announced several other promotions within the Monsanto Plastics sales organization. S. A. Bell, who has been asst. sales manager in charge of plastic sheets, rods and tubes, has been made sales manager of that department. K. J. Eklund, assistant sales manager of cast phenolic plastics, has been appointed sales manager of this division. S. L. King has been appointed sales manager for Vue-Pak, a rigid transparent sheet plastic for packaging and displays. The promotions of Mr. Bell and Mr. King fill vacancies created by the recent advancement of F. A. Abbiati to assistant general sales manager of the Plastics Div. Mr. Eklund's position is a newly created one.

George C. Gress, sales manager of Monsanto cellulose acetate and polystyrene molding materials, has been transferred to Detroit as manager of all plastics sales for that area. According to Mr. Clark, the increased consumption of plastics of all types in the Detroit area, in both the automotive and custom-fabricating fields, has made necessary this expansion. W. H. Face, who has been the Monsanto Plastics sales representative on the Pacific coast, has been transferred to St. Louis, where he will be branch manager for the Plastics Division.

THE 17TH EXPOSITION OF CHEMICAL INDUSTRIES, which will be held at Grand Central Palace, New York, December 4 to 9, will include displays of plastics and their versatile applications in addition to chemical raw materials, manufactured products, plant machinery and equipment, and metals and alloys.

PLASTIC INLAYS, INC., SUMMIT, N. J., HAVE RECENTLY opened Chicago offices in the Wrigley Building, with Lee M. Rogers, as branch manager.

FRANCIS A. CALDEN FORMERLY WITH THE E. W. BLISS CO. and Akerlund & Semmes, has recently joined the hydraulic press sales staff of the Birdsboro Steel Foundry & Machine Co., with headquarters at Birdsboro, Pa. Mr. Calden is well known to hydraulic press users in the United States, Canada, Mexico, Central America, Europe and eastern Asia for his hydraulic press designing, erecting, testing and sales engineering work.

GEMLOID CORP., WELL KNOWN FABRICATOR OF GEMLOID dials, Enameloid and Cloisonne, has entered the injection molding business at 79-30 Albion Ave., Elmhurst, Long Island, N. Y. Three new buildings have been erected, one of which will be devoted entirely to injection molding and incidental operations. The new general offices of the company are located on an upper floor in this same building.

BAKELITE CORP., 247 PARK AVE., NEW YORK, N. Y., ANnounces the development of Bakelite polystyrene film for electrical insulation purposes. All of the many advantageous properties that are found in polystyrene molding material are incorporated in this new film which has been developed especially for such uses as wound capacitors in radio sets and other types of electrical equipment. The low power factor of Bakelite polystyrene film produces capacitors which are extremely efficient. It is also important that these capacitors have stable capacitance not only with changes in temperature but also for various frequencies. The electrical properties of this film will remain constant even at varying temperatures.

This is made possible because of the stable characteristics of polystyrene and its exceptional water resistance. The film is water white in appearance, but may also be had in a tinted shade of purplish black. It is supplied in ribbons 1 1/2 in. and 2 1/2 in. wide and wound on spools to a diameter of 4 in. The standard thickness is 1 mil; certain other thicknesses might be supplied. (A use of this film is shown above.)

COLONEL HARLOW D. SAVAGE, VICE-PRESIDENT OF BAKER and Spencer Engineers, has been elected executive vice-president of Universal Plastics Corp. Colonel Savage will devote his full time to the affairs of the corporation and will, for the present, be located in the New Brunswick, N. J., offices, according to a recent announcement by President Richard A. Loeb.

KURZ-KASCH, INC., REPORTS THE APPOINTMENT OF CHARLES F. Hamilton as its representative in Michigan. Mr. Hamilton will work from the company's Detroit office in the Stephenson Building.

CALDWELL PRODUCTS, INC., 16 W. 22nd ST., NEW YORK, N. Y., has recently equipped a modern machine shop and tool room for the making of models, tools, dies and automatic injection molds.

CELLULOSE ACETATE MOLDING COMPOUNDS SHOW INcreased production of nearly 3,000,000 lbs. during the first nine months of this year over the figures for the corresponding period of 1938, according to a Dept. of Commerce release. In fact, the 7,862,999 lbs. produced up to October 1, 1939, is more than the total production for 1938 which was 7,394,291 pounds.

Sheets, rods and tubes of acetate for the first nine months of 1939 show an increase of more than 3,000,000 lbs. or a total of 6,715,530 lbs. This makes a total production of cellulose acetate plastics up to October 1, of more than 14,500,000 pounds.

Cellulose nitrate sheets produced during the first nine months of this year reached nearly 7,000,000 lbs. which is approximately 2,250,000 more than for the corresponding period of 1938. Rods and tubes total slightly more than 2,500,000 lbs., or an increase of 500,000 lbs. over the same nine months in 1938.

THE PARKWOOD CORP., manufacturer of laminated woven veneer, has moved its factory and offices from Leominister, Mass., to 24 Water St., Wakefield, Mass.

(Please turn to next page)

A COURSE IN INDUSTRIAL PLASTICS, SURVEYING MOLDING, general background and fundamental knowledge of plastics to be applied to manufacturing, sales, etc., in every field, will be offered by the University of Toledo, Ohio. Classes will meet Thursday evenings, 8:15 to 10 P. M., under the instruction of Robery E. Kinsey, Research Dept., Closure and Plastics Div., Owen-Illinois Glass Company.

C. K. CASTAING ANNOUNCES THAT HE IS IN A POSITION TO accept assignments for engraving on plastics at his Stony Brook, L. I., studio. He recently executed a large Plexiglas panel, now in the Savarin restaurant at Pennsylvania Station, New York.

PLASKON CO., TOLEDO, OHIO, ANNOUNCES THE FOLLOWING changes in its personnel: R. B. Harrison, formerly of Toledo, has moved to Chicago, where he has been placed in charge of sales in that territory. W. N. Shepard, formerly in Chicago, is now in Toledo and will handle advertising and territory sales there. Alfred Egerter, returned to New York, will devote a large part of his time to sales and sales promotion. Dr. M. H. Bigelow has been designated technical representative of the sales department with headquarters in Toledo. J. A. Joyce has been sent to New York and will be identified with sales and service in part of the eastern territory.

MOLDED PRODUCTS CO. ARE NOW OPERATING IN NEW, larger quarters at 20 E. Chicago Ave., St. Paul, Minn. Telephone number is Riverview 5131.

A NATIONAL CONFERENCE ON PLASTICS AS APPLIED TO THE field of interior design will be sponsored by *Interior Design and Decoration* on December 11 and 12 at the Waldorf-Astoria Hotel, New York City.

There will be addresses by well-known authorities from the plastics industry and professional designers, followed by discussions during which questions will be answered. An exhibition of furniture, lighting equipment, and decorative accessories all made of plastics will be on display. All those interested in the applications of plastics in interior designing are invited to attend.

THE OPENING OF ITS DETROIT DISTRICT SALES OFFICE AT 503 New Center Bldg., has been announced by John S. Barnes Corp., Rockford, Ill. Under the direction of Arnold J. Werner, this branch will render engineering service for special hydraulic structures as well as supply standard Barnes hydraulic equipment.

NEW YORK UNIVERSITY'S SCHOOL OF ARCHITECTURE AND Allied Arts greatly expanded its department of industrial design this fall, Dean E. Raymond Bossange reported recently. Gilbert Rohde, designer of exhibits in the Home Furnishings Building and several industrial exhibits at the New York World's Fair, has been appointed head of the department, and has the support of an enlarged staff.

WALTER P. CAHILL, GENERAL SUPERINTENDENT AND MEMber of the board of directors of Graton & Knight Co., Worcester, Mass., has resigned from the company after twenty years of service.

THE NEWLY ORGANIZED MARTINDELL MOLDING CO., TRENton, N. J., has built and equipped a modern factory at North Olden Ave. and Sixth St. M. H. Martindell, formerly vice-president and general manager of Jos. Stokes Rubber Co. is president and secretary-treasurer of the new company and Godfrey Zentmayer has been named vice-president. H. P. Koenneke will be the engineer and general manager.

JOHN T. AMES, VICE-PRESIDENT OF KAY-FRIES CHEMICALS, Inc., has been elected vice-president also of American British Chemical Supplies, Inc., of New York, and Charles Tennant & Co., Ltd., of Canada, associated companies. Mr. Ames will assume the duties of E. H. Watson who died September 24.

WALTER DORWIN TEAGUE, DESIGNER FOR INDUSTRY, HAS moved his offices to 444 Madison Ave., New York, N. Y. The new telephone number is Plaza 3-6272. *(Please turn to next page)*

MARBLETTE CORP., 37-21 THIRTIETH ST., LONG ISLAND CITY, N. Y., expects to acquire another building, adjoining its present plant, about December 15, which will expand the productive floor space of the factory by 10,000 square feet. The expansion has been made necessary by the increasing demand for cast phenolic resins and other products made by the company which include Quick-Set, a transparent adhesive capable of setting without heat or pressure. Quick-Set may be molded also in rubber or plaster molds and has attracted the attention of designers and manufacturers requiring small production runs which may be turned out from inexpensive molds.

RÖHM AND HAAS CO., 222 W. WASHINGTON SQ., PHILADELphia, Pa., announces a recently developed resin gum (RHotex A-20) which is described in a leaflet now available. The properties of the material, according to the printed release, recommend it for use wherever natural gums such as tragacanth, karaya, and locust bean are employed. RHotex A-20 can be used as a water soluble thickener, a clear colorless film base, a solvent-resistant coating, a printing paste thickener, a warp-sizing agent, an emulsifying and dispersing agent, and an adhesive compounder, it is claimed. As a domestic product, its steady and dependable supply is assured.

GOUVERNEUR GENERAL MARCEL OLIVIER, COMMISSIONER General for France to the N. Y. World's Fair, held a reception for the Technical Press in the Science section of the French Pavilion on October 17. Following a brief welcome by the Commissioner General, Francois Kertesz outlined the program of science in France and conducted the guests on a personal tour of the various exhibits.

The French Science Exhibit, which closed for the season at the end of October, had as honorary president Mr. Jean Perrin, Nobel Prize winner, member of the Academy of Science, and, as executive president, M. Joliot-Curie, Nobel Prize winner, professor at the College of France, who plan to re-open the exhibit next Spring.

IN ITS PLANT AT PEKIN, ILLINOIS, THE CORN PRODUCTS Refining Co. has begun the commercial production of zein, an aqueous alcohol soluble protein. This prolamine is being sold as *Mazein* by the Corn Products Sales Co. and as *Mazite* by The Prolamine Products Co., Inc. By itself zein forms a brittle film. A plasticizing material or a modifying agent is required for most purposes.

Zein is used for coating paper and similar material and, with the use of aniline dyes, in printing paper and boxboard in solid colors. Alone or in combination with other resins, zein may be used for impregnating and laminating purposes as well as other molding processes. Zein plastics may be molded.

PRODUCTION CAPACITY AT ATLAS PRESS CO., KALAMAZOO, Mich., has again been increased by a recent plant addition which provides new working area of 17,000 sq. ft. The added floor space steps up manufacture of the company's lathes, shapers, drill presses and arbor presses. An addition of approximately the same size was completed in November 1937.

THE MANUFACTURE OF *SOMITE*, AN ACETYL CELLULOSE plastic, which is claimed to be an ideal substitute for metallic materials, will soon be undertaken on an industrial basis in Japan, according to a report from the Assistant American Commercial Attache at Tokyo, made public by the Department of Commerce recently.

Somite, which is said to be made of waste fiber by the viscose process, is claimed to combine the plasticity of synthetic resin, ductility of celluloid and the strength of vulcanized fiber. The product is now being used in the manufacture of conduit tubes, hinges, door handles, radio sets, lighting apparatus, flashlight cases and similar articles. It is reported to be insoluble at high temperatures, and little affected by acetone, benzene, oil and other hydro-phobe materials.

METHYL OLEATE AND METHYL STEARATE ARE NOW BEING produced commercially by Glyco Products Co., Inc., 148 Lafayette St., New York. These materials, which are insoluble in water and soluble in oils and organic solvents, have created considerable interest because of their special characteristics and application. They are suggested for


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Two years of experimentation went into developing this MILLS MOLDED "Lucite" mouthpiece for clarinets or "licorice sticks." The results are appreciated by amateur and professional musicians—and also by Modern Plastics Competition Judges!
To the Pedlar Company, makers of fine musical instruments, we offer our congratulations for their achievement of a more durable clarinet of richer tone and greater beauty.
Until you have checked with us don't conclude that it cannot be done in plastics. Submit your problem to us. If it can be done by injection molding, we can do it.
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use as plasticizers for various kinds of coatings; cleaning and polishing compounds; carrier for dyes; molding and special lubricants; cosmetic lipsticks; stencil sheets; carbon paper; softeners, etc.

J. ANTHONY GARRITY, DESIGNER, NATIONALLY KNOWN IN aviation, automotive, motion picture and boating circles as "Anthony," has been appointed designer for the Eastern Division of Designers for Industry, Inc., with headquarters in Rockefeller Center, New York, according to announcement by Chief Design Director, Lawrence W. Blazey, of Cleveland. M. H. Avram, has been made director of the new engineering department, with W. John Price as his assistant.

Bertram M. Ainsworth, nationally known sales and marketing expert, has been named merchandising counsel by the same company, and will head a new division providing a broad-scope merchandising consultation service to manufacturers and commercial organizations.

THE DOW CHEMICAL CO. IS DEVELOPING A NEW FIBER TO BE substituted for silk in the manufacture of hosiery yarn. The new synthetic product is called *Etho-raon*.

ALBANENE, A NEW TRACING PAPER MADE BY KEUFFEL & Esser Co., Hoboken, N. J., is made of long fiber, clean white rags, treated with a new crystal clear synthetic solid called Albanite. This transparentizing agent is said to be free from oil and wax and both chemically and physically inert. It is claimed, therefore, that the paper will not oxidize, turn yellow, become brittle or lose transparency.

NEW HIGH MELTING POINTS, 155 TO 160 DEG. F. AND 170 TO 175 deg. F., are now available in the Conewango Refining Co's Cercon line of waxes. These two new series, supplied in the full range of standard Cercon colors, have necessitated the expansion of production facilities in the company's plant at Warren, Pa.

NEW ACETATE TECHNIQUE

(*Continued from page 85*) solvent atmosphere. The setting and cure shrinkage is only sufficient to insure a good mold parting, and what shrinking there is, is uniform and faithfully retains the mold contour.

Product strength and resiliency may be anything desired and depend on the kind and quantity of plasticizer employed, although, as remarked above, use of a large percentage of inert material will make the product brittle. Using the protection coating developed for that purpose insures clean mold parting and long mold life except in the case surfaces containing sharp projections and intricate detail. There is apparently no size limitation except that imposed by the mold weight, nor shape limitation as long as the mold can be opened for removal of the finished ware.

No less than five means are available for applying the mixture to the mold surface, depending on the mold shape and type of ware, and several of these are adaptable to automatic or semi-automatic manipulation, thus assuring a low labor factor. In these cases, quick setting will be an asset since it will improve production speed.

Polariscope examination of the finished ware discloses why it shows no tendency toward warping or distortion. As might be expected there is strain in the piece but it is localized in the interstices between the individual grain nuclei. A large number of strain centers, pulling against one another, are self compensating and so cannot throw the piece out of shape. (*Please turn to next page*)

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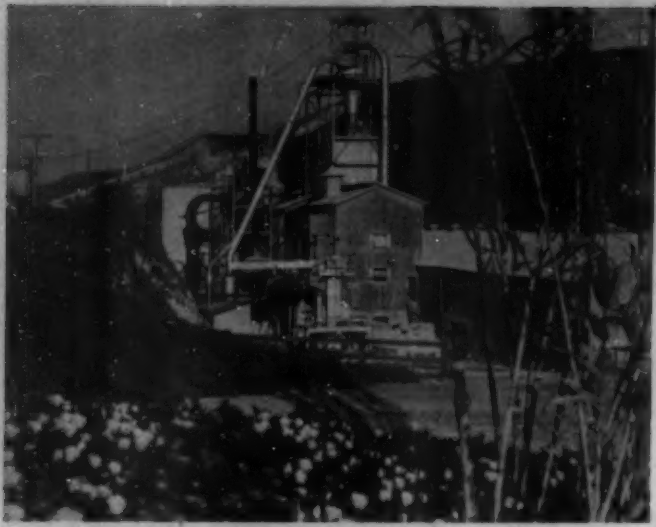

Finally, there is no waste material produced since all waste and defective ware can be used in the preparation of new solution.

As might be supposed, the World's Fair exhibit has been responsible for many inquiries from manufacturers and others who see in the process and product a solution to their problems or opportunity for sales in new markets. The range of products and markets suggested by these inquiries is exceptionally broad, and strangely enough, most of them are new to plastics. It appears, therefore, that sales will be supplementary to, rather than competitive with present plastics production.

The inquiries fall within natural market categories as follows:

1. Wall panel, molding, and other architectural trim.
2. Lighting globes, shades, grills, moldings, and other fixture elements.
3. Elements of illuminated signs of the "Flexlume" type.
4. Coffins, especially those for children and infants. This promises to be a highly profitable market.
5. Religious and decorative sculpture and statuary including human and other figures, crosses, altar trim, etc.
6. Elements of merchandising display assemblies.
7. Mirror frames and other furniture trim.

In view of the wide market range, proper development of the process possibilities in the United States will require numerous manufacturing licensees, some operating on a market, and others on a geographical basis, and all supervised by a primary licensee as administrator. Negotiations looking toward appointment of the primary licensee are now under way, and at their conclusion, placement of manufacturing licenses will be in order.

It is too early to venture more than a guess regarding the ultimate position which this material and process will occupy in the plastics market firmament. Much will depend on the licensing and merchandising policies but if these be sound, the process should quickly acquire a place close to the front of the technique procession.

COLD FLOW OF THERMOPLASTICS

(*Continued from page* 93)

	Formula I	
	Molding flow temperature 280 deg. F. (soft)	Molding flow temperature 350 deg. F. (hard)
Elongation, percent	33.1	9.0
Tensile strength, lbs. per sq. in.	4,300	8,600
Flexural strength, lbs. per sq. in.	6,400	15,300
Compressive strength, lbs. per sq. in.	12,000	25,800
Impact strength, ft. lbs. per sq. in. (Charpy)	21.4	8.0
Cold flow, (Under pressure of 4000 lbs. per sq. in. for 24 hrs. at 120 deg. F.) percent	51.5	3.0

Importance of design in avoiding cold flow

Aside from the choice of formula, avoidance of cold flow in articles molded from thermoplastics is primarily

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a matter of design. The problem, of course, is to minimize or remove stress or strain from the plastic portion of the article. This is most easily done by strengthening the sections subject to flow—increasing the size of the molded part or including some type of rib construction. In the ciné reel core shown in Fig. 1, for example, the slot across the face necessary for holding the end of the film would weaken the piece considerably were it not reinforced at this point by additional material. The additional ribbing at regular intervals around the periphery strengthens the whole core and decreases possibility of cold flow to a minimum.

The commonest method of avoiding cold flow is the use of metal inserts. These take the direct stress at any one point and distribute it over a considerable area. Particularly useful is this device for holding molded

In the oil gage (6) and Chrysler instrument panel (7), decreased thickness without attendant cold flow is obtained by injection molding thermoplastic material around a thin metal stamping. Tenite is used in both items

6

7

pieces to other parts. A typical example is the saw handle (Fig. 5) which is shown diagrammatically in Fig. 4 and the fishing reel end (Fig. 3).

Metal may also be used in such a manner as to permit a decrease in the thickness of the plastic without encountering the liability to cold flow. By the injection molding process a thermoplastic material can be molded completely around a thin form stamped from sheet metal,[3] the combination making a part with the strength of metal and all the color possibilities of the plastic, without the costs attendant upon finishing the metal by polishing or plating. The oil gage shown in Fig. 6 is an example of this type of work, as is the Chrysler instrument panel, Fig. 7.

[3] Cf. Product Eng. Vol. 10, No. 3, p. 107 (March 1939).

UP IN ARMS

(*Continued from page 83*) piece resting against a solid block so that the stock received the full recoil of the gun. The first 25 shots were made with factory proof loads, which have a recoil of about $2^1/_2$ times that of a normally loaded shell. These were followed by several hundred rounds of regular ammunition. The hard rubber butt-plate crumbled from the constant hammering, but the plastic stock showed no fracture or distortion. These tests were repeated on other guns of various gages and calibers, and thousands of rounds were shot. Wooden stocks, under such severe firing tests, have split or cracked many times, but there was no sign of failure on the part of any of the plastic stocks.

The next step was to submit the material to a series of tests to determine its serviceability under various climatic conditions. The guns were placed in boxes kept at below freezing temperatures and then transferred to high-temperature, steam-heated compartments. The plastic stocks retained their dimensional stability and shock resistance, thus proving that the material could withstand the weather conditions that would be encountered in the field. However, it was not until after months of actual field testing had further demonstrated the practicality of these plastic gun parts that the materials was finally adopted for use.

The development of this plastic stock represents an outstanding achievement in the plastics industry. At the time Stevens first conceived of a molded stock, no method had yet been devised by which the job could be done, in spite of the tremendous strides that have been made in molding machinery and technique in recent years. Considerable credit, therefore, should be given to the molder whose ingenuity finally designed the means by which this stock could be made.

It was felt that the appearance of burled walnut could not be improved upon, but to produce this distinctive effect by molding a variegated plastic was not easy. Standard methods of molding were automatically eliminated, so a special machine was built which would first extrude the material and thus produce the desired grain flow. The second phase of its operation was to press the

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WANTED IMMEDIATELY: Large Molding Presses, Multiple Ram Presses, Injection Presses, Hydraulic Pumps, Hydro-Pneumatic Accumulators, Preform Machines, Pebble Mills, Mixers, Sifters, etc. WILL PAY CASH. We carry large stocks of Plastics and Hydraulic Equipment. Send us your inquiries. Reply Box 220, Modern Plastics.

New York Manufacturer's Agent with large following among novelty jewelry and dress accessory trades wishes to represent reputable manufacturer of novelty plastics on commission basis. Volume business assured. Reply Box 312, Modern Plastics.

Wanted—Immediately. Sales representative familiar with Injection Molding Industry. Splendid opportunity with concern just started. Reply Box 313, Modern Plastics.

Toolmaker Foreman wanted for New Jersey with experience on Injection and Compression Molds. State full particulars. Box 314, Modern Plastics.

Wanted to contact Molding Technician who is thoroughly experienced in injection and compression molding, designing, estimating, and production. Must have full knowledge of all angles of manufacturing, and capable of assuming full charge. Desire is to start small molding co. in mid. west small town. No investment necessary, if interested state age and experience in detail, correspondence invited. Reply Box 315, Modern Plastics.

Responsible Detroit firm has opening for man well grounded in sales service work in Plastic Molding Materials, especially Cellulose Acetate. Reply Box 316, Modern Plastics.

RESEARCH WORKERS: We offer every cooperation, assistance and counsel in developing new ideas applying to ceramic products of all kinds. . . . Write or call at our office, where complete laboratory and technical facilities are available. Reply Box 311, Modern Plastics.

Wanted: Experienced man as foreman for plastics fabricating shop. Involves miscellaneous fabricating, especially forming thermoplastics, and designing tools for special projects. Reply Box 317, Modern Plastics.

Wanted: #5 or #5½ Colton preforming machine and Model R or T stokes preforming or tablet machine. The Bordman Co., 147 N. 3rd St., Phila., Pa."

WANTED: CELLULOSE ACETATE SCRAP, unground or reground, as well as lumps; also acrylic or methacrylic resin scrap and celluloid scrap. Send details concerning quantities and price. Reply Box 318, Modern Plastics.

WANTED: Casein Waste, cured or uncured, and Urea Waste, cured or uncured, in carload lots. Reply Box 319, Modern Plastics.

Product engineer, 32, degrees in Electrical Engineering and Architecture, experienced many industries especially radio and illumination wants position with reliable plastic firm where education and experience may be asset. Salary neither exorbitant nor bargain. Now employed. Reply Box 320, Modern Plastics.

PLASTIC DEPARTMENT MANAGER

Nationally known company has opening for experienced plastic man to take charge of injection molding department engaged in the manufacture of large items. In reply, stage age, experience in handling costs, production, and engineering problems. Reply Box 321, Modern Plastics.

AVAILABLE—Creative Designer, Technician, Experienced in plastics in all phases. Qualified to design, create and superintend manufacture of industrial, display, novelties, gift items, signs, etc. Can design home decorations, theatrical interiors, lighting fixtures and any items which can possibly be made of plastic. Photographs and sketches of work available to responsible executives. Reply Box 322, Modern Plastics.

WANTED: Stainless Steel or Nickel Kettle, Vacuum Pan, Hydraulic Press, Preform Machine and Mixer. Reply Box 275, Modern Plastics.

FOR SALE: Complete stock of Rebuilt Machinery, including Hydraulic Presses, Mixing Rolls, Accumulators, Pumps, Preform Machines, etc. Send for complete lists. Reply Box 281, Modern Plastics.

Above: The Stevens gun with Tenite stock and fore-end is demonstrated by Frank Kelly, champion skeet shooter

material into the die for shaping. By this method, only a very few minutes are required to mold a complete gun stock and fore-end. This high molding speed, coupled with the fact that there is no process in the manufacture of the material that requires waiting for aging or curing, makes possible the mass production of these parts at a speed never before attained in the arms industry.

The success of this plastic application cannot be attributed to one individual but is the result of a fortunate combination of engineering, material, and fabrication.

LIGNIN PLASTICS CREATED FROM PULP LIQUOR WASTES

(*Continued from page 96*)

Yield of by-products

Plant operations on commercial scale by Marathon have shown it is entirely practical to collect and process waste sulphite liquor by the three-stage lime precipitation treatment and have either fully confirmed original estimates as regards yield and character of products and operating expenses or have demonstrated with reasonable certainty that they are attainable with improvements in operation.

The yield of the inorganic product has been fully up to expectations and its calcium sulphite content is being successfully utilized by the pulp mill for making fresh cooking acid with a corresponding reduction in other lime and sulphur requirements and without complications in the pulp mill. (*Please turn to next page*)

The yield of the organic product has not been fully up to preliminary estimates due to unforseen secondary reactions which have resulted not only in a lower recovery of the organic product but some increase in lime reagent requirements. The remedy for this adverse operating condition is now known, however, and the necessary alterations to correct it are being made, with some indications of their resulting in even a higher yield of of this product than originally estimated.

Uses of the lignin fraction

The most fundamental accomplishment of this work at Marathon is the segregation of the major components of sulphite liquor thereby facilitating its more complete utilization and making available for the first time a large tonnage of lignin as a new organic raw material at low cost and in most favorable form for commercial uses. The basic calcium lignin sulphonate recovered as the organic product constitutes such a lignin raw material. It is comparable with coal in its chemical potentialities and has already found various uses both with and without further processing. It lends itself to processing by the procedures of organic synthesis and to inorganic modifications.

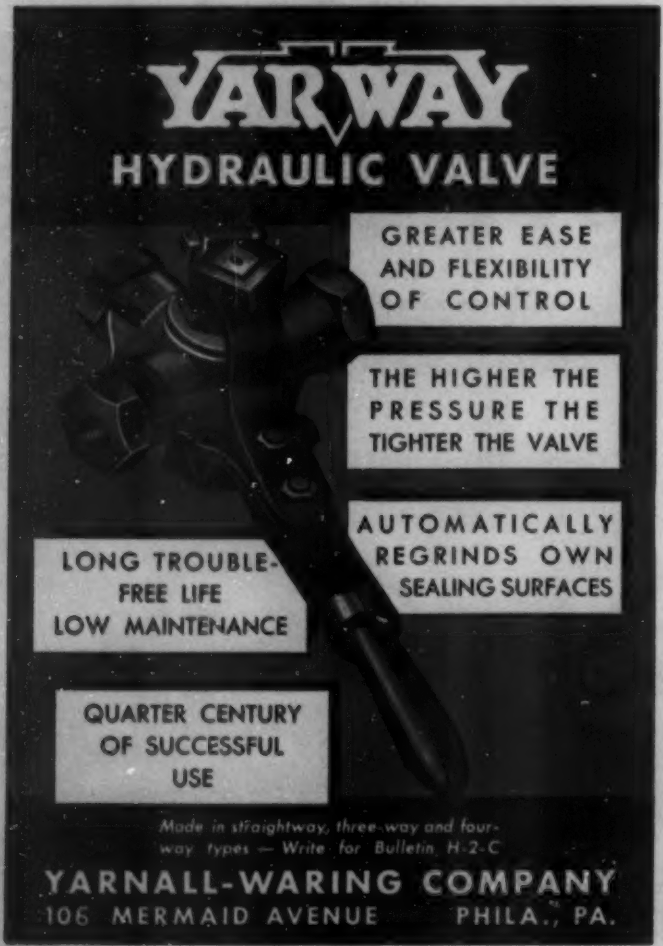
The organic product without further processing other than drying and grinding is now being used in carload amounts for various purposes and other tonnage uses are in prospect. Its use as a boiler fuel requires that the wet filter cakes containing around 70 percent moisture undergo reduction in their water content. This is accomplished by mechanically pressing the filter cake in a tractor type press designed by Marathon and built under the Thompson patents. It yields a pressed cake containing around 50 percent moisture which has been successfully burned over long periods with admixture of 10 percent coal screenings in a standard water tube boiler equipped with Firite stoker, and with an overall heat efficiency around 70 percent for this wet fuel.[2]

The organic product can be converted by inorganic modifications into a complete series of lignin sulphonate salts and into the free lignin sulphonic acid. Of these the magnesium, calcium and sodium salts are now being made and sold in tonnage quantities for use in tanning leather, in treating boiler waters, in products going into cement, as dispersing agents, grinding aids and for various other uses.

More than one-third of the vanillin manufactured in the United States is now being made from this lignin raw material and the excellent quality of this lignin vanillin has been fully established.

The spent effluent liquor from the vanillin operation is being processed further to make lignin plastic products, which are expected to ultimately include lignin core and surface sheets for laminating, lignin molding compositions for positive, injection and impact molding and special lignin resins for coating, impregnating and adhesives. Of these the lignin laminating sheets are in

[2] For more detailed discussion of the burning of this organic product as a boiler fuel see Transactions of American Society of Mechanical Engineers for paper by Mr. Grover Keeth, Chief Engineer, Marathon Paper Mills Co. at New Orleans Meeting, Feb. 24, 1939.



commercial production and the molding compositions and special resins are in semi-commercial production about ready to release.

Lignin laminating sheets

Marathon lignin laminating sheets are manufactured for the specific purpose of laminating and consist of resins uniformly distributed in a fibrous base. The resinous component is a mixture of thermoplastic lignin resins while the fibrous component is cellulose, both of which are derived from wood. In manufacturing these sheets the natural lignin content of the wood used in the process is retained and supplemented by additional lignin thereby producing a lignin enriched sheet. We are thus able to control the lignin content of the product and produce laminating sheets of various grades to meet the requirements of the laminating industry.

Lignin laminating sheets as shipped and ready for molding are brown in color and are available in rolls of any width from 4 to 100 in. or in sheets cut to size and shipped flat. They are approximately 0.015 in. (15 mils) thick and weigh about 4 lbs. per 100 sq. feet.

The laminating of these sheets is done in standard equipment and in the usual manner by placing a number of sheets one upon the other and applying heat and pressure. The laminated lignin plastic will be reduced about 60 percent in thickness as compared to the total thickness of the sheets before laminating. As an example 100 sheets would be 1.5 in. thick before laminating and about 0.6 in. thick after the laminating operation. These laminated products can be made varying in thickness from 0.006 in. by molding one sheet alone, to 2 in. or more depending on the number of sheets used. One square foot of the laminated material $^1/_8$ in. thick will weigh about 0.88 of a pound.

The laminated lignin plastic is black in color and can be made with a smooth, rich finish ranging in luster from a dull satin to a high gloss. If a colored surface is desired any of the commercially available colored surface sheets can be laminated to the lignin sheets during the molding operation. Many of the colored coating resins now on the market can also be applied to the surface of this laminated product. In this way it is possible to produce a finished product with the color and highly resistant surface characteristics of the coating resins or sheets used as surfacing materials. The Marathon Chemical Co. does not do laminating or molding, but manufactures and sells the unmolded sheets in forms and grades suitable for various laminating purposes.

The laminated lignin product has excellent nailing, punching and machining qualities and in general the same operations used in machining other laminated plastics and metals are applicable. It is a tough, strong, water- and oil-resistant material and has a high degree of flexibility in the thinner sections. The table (next page) lists the range of strength values and other properties of these products. *(Please turn to next page)*

Specific Gravity................	1.36–1.40
Specific Volume, cu. in. per lb...	19.8–20.5
Tensile Strength, lbs. per sq. in..	8000–15000
Modulus of Elasticity, lbs. per sq. in. by 10 to 5th power.........	8–15
Compressive Strength, lbs. per sq. in...........................	25000–35000
Flexural Strength, lbs. per sq. in.	11000–25000
Impact Strength, ft. lbs. C. N....	1.5–2.0
Molding Temperatures..........	Up to 392° F. (200° C.)
Molding Pressures, lbs. per sq. in.	1000–2000
Water Absorption, % in 24 hours.	0.5–3.0

Other Marathon lignin plastics

The lignin molding compositions will be of both the thermoplastic type for injection and impact molding, and the thermosetting type involving "curing" reactions. They will be made available to molders in various grades suited to the use requirements. These are primarily intended as low cost compositions of suitable strength, chemical resistance, and other properties for making various dark colored products and to be of practical moldability for the majority of commercial shapes.

The ordinary lignin resins are moldable under heat and pressure and are permanently thermoplastic unless set with some of the hardening agents commonly used with phenolic resins. They are dark in color and soluble in alcohol and similar solvents but insoluble in the hydrocarbons. These ordinary lignin resins are not well suited for coating and impregnating unless modified but can be converted into superior resins for such purposes. The modified lignin resins are quick curing resins giving coatings with excellent resistance to solvents, alkalies and acids. They are soluble in alcoholic solvents before curing and give insoluble black glossy films with good physical properties. These modified lignin resins can also be used to advantage as quick curing adhesives with superior resistance to water, solvents, alkalies and acids.

Patent situation

Marathon's developments in the processing of sulphite liquor and the recovery of various special products therefrom have been patented in the United States and foreign countries. These patented processes are available on reasonable terms to the sulphite industry as a disposal method of handling sulphite liquor to reduce stream pollution but with the use of the recovered products restricted to the pulp mill for making fresh cooking acid and as a boiler fuel. As a combined disposal and utilization method of handling sulphite liquor with manufacture of products for sale it is necessary to keep the production of such products in line with their market outlets and hence, for the present at least, patent rights to make and sell special lignin products cannot be made available to other pulp mills. The processing of sulphite liquor at Marathon is now on a profitable operating basis and it is expected to be an increasing source of profit to the company both from increased sales of liginn products now being manufactured and from new products under development.